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PROCEEDINGS

OF THE

Biological Society of Washington

VOLUME 33
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Paul Bartsch, 1914, 1915
W. P. Hay, 1916, 1917
J. N. Rose, 1918
Hugh M. Smith, 1919

* Deceased.

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IV. Facing p. 178. Cockleburs (Xanthium).

The Committee on Publications declares that each paper of this volume was distributed on the date indicated on its initial page. The Index, title page, and minutes of meetings for 1920 (pp. i–xiv; 187–194) were issued on March 15, 1921.

Vol. 33, pp. IX-XIV.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets from October to May, on alternate Saturdays, at 8 P. M. All the meetings in 1920 were held in the lecture hall of the Cosmos Club.

January 10, 1920—604th Meeting.[1]

President Hopkins was in the chair; 45 persons were present.

Mr. Jacob Kotinsky was elected to membership.

President Hopkins announced the membership of standing committees as follows: Of the Publication Committee, C. W. Richmond, Chairman, J. H. Riley, N. Dearborn, A. Wetmore; of the Committee on Communications, S. A. Rohwer, Chairman, C. E. Chambliss, R. E. Coker, F. Harper.

Informal Communications: President Hopkins, Suggestions to the Biological Society; W. P. Taylor, Notes on the mammals upon Mt. Rainier at high altitudes; T. S. Palmer, Note upon fossil birds described from America.

Formal Communications: T. E. Snyder, An account of the habits of the Termites or White Ants; William Palmer, Some birds of Chesapeake Bay.

January 24, 1920—605th Meeting.[2]

President Hopkins was in the chair; 85 persons were present.

J. S. Gutsell, R. W. Williams, A. H. Hardisty were elected to membership.

Informal Communications: B. W. Evermann, Notes on the Museum of the California Academy of Sciences, and on the Pelicans of Pyramid Lake, Nevada.

Formal Communication: Ernest Thompson-Seton, Habits and home life of the Kangaroo Rats of our western deserts.

[1] Abstracts in Journ. Washington Acad. Sci., vol. 10, No. 10, p. 304, May 19, 1920.
[2] Abstracts in Journ. Washington Acad. Sci., vol. 10, No. 10, p. 306, May 19, 1920.

February 7, 1920—606th Meeting.[3]

President Hopkins was in the chair; 45 persons were present.

C. F. Sylvester, A. Böving, Miss Julia B. Hoge, Miss Doris Cochran, Miss Ethel Wright, Miss Lillian Malone, Miss Rosalie Field, H. S. Hoffman, J. L. Baer, L. G. Usilton, J. Stein, R. J. Bosworth, A. R. Denison, L. Rosenblatt, L. M. Evans, W. A. Jenkins, J. E. Maxwell, and J. Russell were elected to membership.

Informal Communications: W. P. Taylor, Note on the flocking of small birds in the forests of the northwest coast; R. E. Coker, Note on the pearl fishery of the Mississippi River Valley, and photograph of stages in the metamorphosis of the Acorn Barnacle; T. S. Palmer, Note on the protection of quail in the District of Columbia; H. M. Smith, Note upon the Alaskan fur seal herd; Paul Bartsch, Note of the need of supplying water for birds in cities.

Formal Communications: C. Dwight Marsh, Some poisonous plants and their effects; Paul Bartsch, Our poison gas detector, and how it was discovered.

February 21, 1920—607th Meeting.[4]

(Joint meeting with Washington Academy of Sciences.)

President A. D. Hopkins was in the chair; 75 persons were present.

Miss D. Langworthy, Miss Marion Pellew, and K. P. Schmidt were elected to membership.

Formal Communication: Dr. Alfred P. Meyer, The corals of the American Samoa.*

March 6, 1920—608th Meeting.[5]

Vice-President V. Bailey was in the chair; 50 persons were present.

T. I. Storer and Miss P. Brown were elected to membership.

Informal Communications: M. B. Waite, Exhibit of naked

[3] Abstracts in Journ. Washington Acad. Sci., vol. 10, No. 10, p. 309, May 19, 1920.

[4] Abstracts published in Journ. Washington Acad. Sci., vol. 10, No. 10, p. 309, May 19, 1920.

*Published in Proceedings of the American Philosophical Society, vol. 59, No. 3, pp. 224–236, 1920.

[5] Abstracts in Journ. Washington Acad. Sci., vol. 10, No. 20, p. 578, Dec. 4, 1920.

buds of *Paulownia imperialis;* A. S. Hitchcock, Note on a trip in British Guiana; L. O. Howard, Note on artificial cherries.

Formal Communications: W. P. Taylor, The birds and mammals of Mount Rainier National Park; D. R. Crawford, The life history of the Spiny Lobster.

March 20, 1920—609th Meeting.[6]

President A. D. Hopkins in the chair; 47 persons were present.

Miss K. G. Symmonds was elected to membership.

Informal Communications: R. W. Shufeldt, Exhibit of the moloch, a lizard of Australia; L. O. Howard and M. B. Waite, Notes upon the cutting back of certain Sycamore trees. T. E. Snyder, Exhibit of photograph of ant's nest.

Formal Communications: F. L. Scribner, The lure of Rock Creek Park; T. E. Snyder, The Lead Cable Borer.

April 3, 1920—610th Meeting.[7]

President A. D. Hopkins in the chair; 42 persons were present.

E. Stringham was elected to membership.

Formal Communications: R. W. Shufeldt, Observations on the cervical region of the spine in Chelonians; W. C. Kendall, Trout of the great west.

April 17, 1920—611th Meeting.[8]

President A. D. Hopkins was in the chair; 80 persons were present.

R. A. St. George and Miss P. T. Newbold were elected to membership.

Informal Communications: A. Wetmore, Exhibit and Note from Dr. M. W. Lyon, Jr., upon the Fish or Broad Tape Worm, and the Beef Tape Worm; W. P. Taylor, Note upon a Black Bear on the summit of Mount Rainier; Paul Bartsch and A. S. Hitchcock, Notes upon a new *Teredo* in Dutch Guiana infesting Green Heartwood; R. W. Shufeldt, Note upon the insect, Beech Blight; A. Wetmore, Reading of a letter from George Haley giving notes upon Alaskan song birds.

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[6] Abstracts in Journ. Washington Acad. Sci., vol. 10, No. 20, p. 579, Dec. 4, 1920.

[7] Abstracts in Journ. Washington Acad. Sci., vol. 10, No. 20, p. 580, Dec. 4, 1920.

[8] Abstracts in Journ. Washington Acad. Sci., vol. 10, No. 20, p. 582, Dec. 4, 1920.

Formal Communication: Hugh M. Smith, Address of the retiring President, Some biological problems in the Yellowstone National Park.

May 1, 1920—612th Meeting.[9]

Former President T. S. Palmer was in the chair, and 30 persons were present.

J. N. Aldrich and E. D. Reid were elected to membership.

Informal Communications: R. W. Shufeldt, Notes on the salamanders of the District of Columbia, and exhibit of *Sarracenia variolarius,* the Spotted Trumpet Leaf from Orlando, Florida, in full bloom; T. S. Palmer, Note on the tendency of animals under protection or partial domestication to advance the breeding season; C. D. Marsh, Note on Loco Weed in New Mexico and Arizona.

Formal Communications: A. S. Hitchcock, Floral aspects of British Guiana.

May 15, 1920—613th Meeting.[10]

Former President T. S. Palmer was in the chair; 47 persons were present.

Informal Communications: T. S. Palmer, Note on the recent meeting of the American Society of Mammalogists; A. Wetmore, Note upon bones from Porto Rican fossil deposits.

Formal Communications: A. Wetmore, Use of Powderdown feathers in birds;* W. P. Taylor, Habits of the Kangaroo Rat in Arizona; E. A. Goldman, The Elk of the Jackson's Hole Region in Wyoming.

October 30, 1920—614th Meeting.[11]

Vice-President N. Hollister was in the chair; 41 persons were present.

Informal Communications: T. S. Palmer, Announcement of the forthcoming meeting of the American Ornithologists' Union in Washington; L. O. Howard, Note upon a flight of Grasshoppers witnessed in France.

Formal Communications: A. H. Clark, on Crinoids; W. J. Swingle, Chinese botany and Chinese botanists.

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[9] Abstracts in Journ. Washington Acad. Sci., vol. 10, No. 20, p. 585, Dec. 4, 1920.

[10] Abstracts in Journ. Washington Acad. Sci., vol. 10, No. 20, p. 586, Dec. 4, 1920.

* Printed in Condor, vol. 22, No. 5, p. 168, Sept. 24, 1920.

[11] Abstracts in Journ. Washington Acad. Sci., vol. 11, No. 3, p. 64, Feb. 4, 1920.

November 13, 1920—615th Meeting.[12]

Vice-President N. Hollister was in the chair; 40 persons were present.

O. P. Silliman, M. Sloog, S. S. Berry and H. J. Pack were elected to membership.

Informal Communications: Paul Bartsch, Notes on injury by a new *Teredo* in San Francisco Bay, and on recently differentiated species of land shells of the genus *Epiphragmorpha* in California, and on the odor of honey eating birds in the Hawaiian Islands; T. S. Palmer, Note on the recent meeting of the American Ornithologists' Union; N. Hollister, Note on the interest in technical subjects in the Biological Society; Wm. Palmer, Exhibit of type skull of *Rhabdosteus*, an extinct dolphin-like animal.

Formal Communications: R. W. Shufeldt, A snake affected with Chiggers; Chas. W. Gilmore, Remarks on some additions to the fossil vertebrate exhibition in the U. S. National Museum.

November 27, 1920—616th Meeting.[13]

Vice-President Hollister was in the chair; 46 persons were present.

The following were elected to membership: H. E. Ewing, R. A. Cushman, R. M. Fouts, T. C. Greene, Carl Heinrich, W. M. Mann, H. Morrison, W. Schaus, L. H. Weld, G. E. Thompson, T. B. Wilson, C. R. Aschemeier, A. L. Bennett, N. H. Boss, W. L. Brown, T. Horn, J. B. Reeside, Jr., Miss G. O. Visel, P. C. Villanneva, D. H. Adams, Miss L. Allison, G. L. Bowen, T. J. Brimer, C. T. Buckingham, Miss A. M. Charest, Miss E. E. Chickering, W. F. Coakley, G. W. Creswell, F. B. Cunningham, W. G. Cushard, Waiva Dean, Joel Deuterman, Miss A. E. Drew, Miss M. E. Drew, E. J. Drummond, D. L. DuPre, E. M. Ellerson, P. S. Gault, W. H. Geisler, W. A. Gersdorff, E. J. Grass, Miss H. F. Hadden, Miss E. M. Hamric, Miss D. Hansen, S. M. Harding, G. S. Hastings, W. H. Hughes, W. Johnson, J. L. McCarther, F. A. Mayer, Miss A. J. Mills, F. Moore, R. W. Murray, Miss E. Nathanson, A. D. O'Donnell, Miss H. R. Ostrom, L. A. Passalaequa, C. W. Parker, H. W. Potter, A. Preece, R. B. Rench, M. Riwchun,

[12] Abstracts in the Journ. Washington Acad. Sci., vol. 11, No. 3, p. 65, Feb. 4, 1920.

[13] Abstracts to be published in Journ. Washington Acad. Sci.

G. L. Roberts, A. S. Rubino, Miss M. Russell, G. P. Savage, H. L. Smith, Miss L. W. Steever, H. C. Straup, Miss L. Van Doren, L. R. Watson, Jr., S. Weinshelbaum, Miss D. V. Nichols.

Informal Communications: L. O. Howard, Comparison of Humboldt's and Bradley's accounts of mosquitoes on the Amazon; J. C. Bradley, Reply regarding mosquitoes on the Amazon; A. S. Hitchcock, Note on mosquitoes in British Guiana; P. Bartsch, Note on erratic occurrence of mosquitoes in Florida; H. M. Smith, Exhibit of artificial animals from Pekin; T. S. Palmer, and L. O. Howard, Announcements of exhibitions of bird drawings at the Library of Congress, and of insect drawings at the Corcoran Art Gallery.

Formal Communications: J. Chester Bradley, *Plumarius*, an aberrant genus of Hymenoptera; W. E. Safford, Hawaii revisited.

December 11, 1920—617th Meeting.

FORTY-FIRST ANNUAL MEETING.

President A. D. Hopkins was in the chair; 28 persons were present.

Annual reports of officers and committees were received.

The resignations of N. Dearborn, Treasurer, and of A. Wetmore, Corresponding Secretary, on May 15, 1920, were announced, and the succession of F. C. Lincoln as Treasurer and T. E. Snyder as Corresponding Secretary.

The officers and members of the Council elected for 1921 are:

President, N. Hollister.

Vice-Presidents, A. S. Hitchcock, J. W. Gidley, S. A. Rohwer, H. C. Oberholser.

Recording Secretary, A. A. Doolittle.

Corresponding Secretary, T. E. Snyder.

Treasurer, F. C. Lincoln.

Members of the Council, W. Palmer, E. A. Goldman, H. H. T. Jackson, R. E. Coker, R. W. Williams.

President Hollister was nominated as one of the Vice-Presidents of the Washington Academy of Science.

The appointment of Committees for the coming year was deferred.

Vol. 33, pp. 1-20 July 24, 1920

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

FUNGOUS INSECTS AND THEIR HOSTS.

BY HARRY B. WEISS AND ERDMAN WEST.

This paper is an attempt to list in a definite manner, the various fungous hosts of certain insects. In most entomological papers dealing with fungous insects, the host is recorded simply as a "fungus." This is very indefinite and almost as unsatisfactory as using the term "evergreen" when a definite tree such as *Pinus sylvestris* is meant. In 1908[1] Schwarz called attention to the opportunity of working with fungous insects in view of the many mycologists in the field. At the present time with more mycologists in the field certainly some attempt should be made to list the fungous hosts by at least their generic if not specific names.

The present paper deals almost entirely with the Coleoptera although some insects in other orders are included and the records are the results of observations made for the most part in New Jersey during the past year. No attempt was made to breed out the various fungous gnats whose larvae are so common in gill fungi. The few records copied from published data are followed by the references. The records from States other than New Jersey are due to the kind coöperation of the entomologists whose names appear after such records.

We are greatly indebted to Mr. Chas. Leng for identifications in the Coleoptera and for references to the literature. It is hoped that in a later paper it will be possible to include a bibliography of all publications in which the generic or specific name of the fungus is given, although such references are

[1] Proc. Ent. Soc. Wash., X, 1908, p. 61.

not numerous in American entomological literature. Our thanks are also due to Mr. Chas. Dury for identifications in the *Cisidae*, to Mr. C. W. Frost for many miscellaneous identifications in the Coleoptera, to Dr. W. G. Dietz for his help with the *Tipulidae*, to Mr. August Busck in connection with the micros, to Mr. Crawford and Mr. Cushman who, through the courtesy of Dr. L. O. Howard, identified the parasites, to Mr. C. W. Johnson, Dr. E. P. Felt and Dr. O. A. Johannsen, who identified the Diptera other than the crane flies, and to Mr. Charles Macnamara, who determined the springtails.

What appears to be a definite relationship between certain fungi and insects has been observed in the past by both mycologists and entomologists. Von Schrenk and Spaulding,[1] writing of the fungus *Polyporus obtusus*, state that "the spores of the fungus germinate in the burrows of an oak-boring insect *Prionoxystus robiniae* Peck. The fungus grows in the borings and follows the insect burrows until it reaches the heartwood of the tree." Concerning the disease *Fomes rimosus* of the black locust, they say, "infection takes place through older branches and through tunnels made by the locust borer *Cyllene robiniae*."

Hopkins, in his "Insect Enemies of the Spruce in the Northeast,"[2] writes as follows about the beetle *Dendroctonus piceaperda* Hopk., and the fungus *Polyporus volvatus* Peck: "Nearly all recently dead trees and even some that are not yet dead but contain broods of the beetle, are found to have small, yellow, globular fungus protruding either from the holes in the roof of the egg galleries or those made when the adults emerged from the bark. This fungus which grows beneath the bark pushes its way out to develop spores or fruiting parts. These fungi are conspicuous objects, and they often occur by hundreds on the bark of the tree for two or three years after they have died and the beetles have emerged. The fact that the work of the spruce-destroying beetle seems to make the conditions more favorable for the introduction and subsequent growth of this fungus indicates that it is more closely associated with the work of this beetle than is any of the other

[1] Bull. 149, U. S. Bur. Pl. Indus.

[2] Bull. 28, N. S. U. S. Dept. Agric. Bur. Ent.

bark and wood-infesting fungi of the spruce. It therefore serves as good external evidence that the dead trees on which it is found were killed by the beetle. It will, however, grow from the burrows made by other insects in the bark or, as observed in one instance, from the burrows of wood-mining beetles (*Xyloterus bivittatus* Kirby) in wood from which the bark had been removed."

Again Ruggles[1] finds that a relationship appears to exist between *Agrilus bilineatus* and the shoestring fungus *Armillaria mellea* in connection with the death of oak. Whether the fungus is necessarily present first acting as a primary cause of death to the tree or whether the combination causes death is, according to Ruggles, a question for further investigation. Another interesting paper, "The Inhabitants of a Fungus,"[2] by Henry G. Hubbard, refers to the insect inhabitants of *Cryptoporus volvatus* Peck var. *obvolutus* Peck, found on pine trees of the Pacific Coast Range from the Columbia River northward into British Columbia. Eleven species of beetles are mentioned, together with unidentified lepidopterous and coleopterous larvae, and these are divided into predatory visitors and fungus eaters. In this paper the beetle *Epuraea monogama* is said to transport the spores while *Platydema oregonense* is said to cause the peculiar filaments which form within the veil of the fungus. Murrill in his "Northern Polypores" states that this fungus is largely dependent upon insects for its distribution, that the sporophores often emerge through insect tunnels, the volva is punctured by insects and the spores carried to other trunks by insects. He also states, however, that the sporophore is annual and matures early in the season so that the volva would probably rupture by decay in time to distribute the spores even if no apertures were present.

Fabre in his "Social Life in the Insect World,"[3] mentions two beetles as being associated with subterranean fungi, *Anisotoma cinnamomea* on truffles and *Bolboceras gallicus* on *Hydnocystis arenaria* and tells at length in his charming style about his observations on the latter species.

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[1] 15th Rep. State Ent. Minn.

[2] Canad. Ent. Vol. 24, 1892, pp. 250–56.

[3] The Century Co., 1913.

In the insect list which follows, the species are recorded as breeding in, feeding on and occurring in or on the fungi. It is extremely probable that those listed as occurring in or on are fungus eaters, except those belonging to such coleopterous groups as the *Carabidae*, and the members of which are predaceous. In the fungus list no attempt has been made to record the activities of the insect again and only the names of the species associated with each fungus are mentioned.

Practically all of the fungi mentioned belong to the families *Polyporaceae* and *Agaricaceae*. In the *Polyporaceae*, "the hymenial surface is generally spread over the inner surfaces of pores or narrow tubes, sometimes over folds or shallow depressions between vein-like reticulations occasionally more or less lamelloid. The sporophores are diverse, generally tough, often very large."[1] In the *Agaricaceae*, "the hymenial surface is confined to radial plates or lamellae, the latter, however, sometimes in the form of folds or veins. The sporophores are generally fleshy with a definite cap or pileus, usually provided with a central stalk, but also excentric, sessile, etc."[1] Members of the *Polyporaceae* are found on both living and dead wood of deciduous and coniferous trees while those of the *Agaricaceae* are mostly terrestrial or occur as a rule on very rotten wood.

INSECT LIST.

Order Coleoptera.

Family **Carabidae.**

Pterostichus adoxus Say. On *Psilocybe* sp., August, Framingham, Mass. (Frost).

Pterostichus lucublandus Say. On *Pleurotus ostreatus*, June 27, Cornwall, Conn. (Chamberlain).

Family **Hydrophilidae.**

Cercyon praetextatum Say. In *Polyporus albellus*, Sept. 12, Springfield, N. J.

Family **Silphidae.**

Necrophorus pustulatus Hersch. On *Pleurotus ostreatus*, June 27, Cornwall, Conn. (Chamberlain).

Family **Staphylinidae.**

Gyrophaena corruscula Er. On *Armillaria* sp., July, Framingham, Mass. (Frost).

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[1] Duggar, B. M. Fungus Diseases of Plants.

Staphylinus maculosus Grav. On *Pleurotus ostreatus*, June 27, Cornwall, Conn. (Chamberlain).

Staphylinus fossator Grav. On *Lactarius* sp., August, Framingham, Mass. (Frost).

Philonthus brunneus Grav. On *Polyporus berkleyi*, August 5, Framingham, Mass. (Frost).

Philonthus cyanipennis Fab. On *Amanita* sp., Lakehurst, July 17, N. J. On *Collybia platyphylla*, July 17, Monmouth Jc., N. J.

Stilicus angularis Lec. On *Polyporus berkleyi*, August 5, Framingham, Mass. (Frost).

Tachinus pallipes Grav. On *Polyporus berkleyi*, August 5, Framingham, Mass. (Frost). On *Collybia platyphylla*, June 17, Monmouth Jc., N. J.

Tachinus fimbriatus Grav. On *Amanita* sp., July 27, Lakehurst, N. J. On *Collybia platyphylla*, June 17, Monmouth Jc., N. J.

Boletobius cinctus Grav. On *Clitocybe maxima*, Framingham, Mass., June 18 (Frost). In *Polyporus albellus*, Union, N. J., Sept. 12.

Oxyporus vittatus Grav. Feeding on *Pleurotus ostreatus*, Cincinnati, Ohio (Dury). On *Naucoria* sp., Framingham, Mass., July (Frost). On *Laccaria amethysta*, Framingham, Mass., Sept. (Frost).

Oxyporus 5-maculatus Lec. On *Psilocybe* sp., Monmouth Jc., N. J., June 17. On *Laccaria amethysta*, Framingham, Mass., Sept. (Frost).

Oxyporus lateralis Grav. On *Pholiota* sp., Monmouth Jc., May 31. Feeding on *Pleurotus ostreatus*, Cincinnati, Ohio (Dury).

Oxyporus major Grav. Feeding on *Pleurotus ostreatus*, Cincinnati, Ohio (Dury).

Oxyporus stygicus Say. Feeding on *Pleurotus ostreatus*, Cincinnati, Ohio (Dury).

Family **Scaphidiidae.**

Scaphidium 4-guttatum Say., var. piceum Mots. On *Polyporus versicolor*, Princeton Jc., N. J., May 8.

Baeocera punctipennis Blatch. Occurs on the large yellow *Clitocybe illudens* (Coleoptera of Indiana, p. 494).

Scaphisoma reparida Casey. In *Polyporus gilvus*, Springfield, N. J., May 30.

Family **Endomychidae.**

Symbiotes waltoni Dury. In *Pleurotus* sp., Cincinnati, Ohio (Dury).

Symbiotes impressus Dury. In *Pleurotus* sp., Cincinnati, Ohio (Dury).

Symbiotes duryi Walton. In *Pleurotus* sp., Cincinnati, Ohio (Dury).

Lycoperdina ferruginea Lec. Occurs inside *Lycoperdon pyriforme*, Indiana (Col. Ind. p. 538). Cincinnati, Ohio, May 30 (Dury).

Endomychus biguttatus Say. Feeding on *Schizophyllum commune*, Monmouth Jc., N. J., July 12.

Family **Erotylidae.**

Dacne 4-maculata Say. In *Pleurotus ulmarius*, Uhlerstown, Pa., June 11.

Megalodacne fasciata Fab. In *Polyporus lucidus, Polyporus versicolor* and feeding on *Pleurotus sapidus*, Springfield, N. J., May 30.

Megalodacne ulkei Crotch. On *Polyporus cuticularis*, Indiana (Col. Ind. p. 545).

Ischyrus 4-punctatus Oliv. Feeding on and breeding in *Poria* sp., Springfield, N. J., July 10.

Mycotretus pulchra Say. Breeds in *Polyporus chioneus*, Monmouth Jc., N. J., Sept. 8.

Tritoma humeralis Fab. Feeding on *Clitocybe maxima*, Framingham, Mass. (Frost).

Tritoma biguttata Say. On *Armillaria* sp., Monmouth Jc., N. J., July 7.

Tritoma thoracica Say. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). Feeding on *P. ostreatus*, Monmouth Jc., N. J., May 30.

Tritoma flavicollis Lec. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Family **Mycetophagidae.**

Mycetophagus flexuosus Say. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). On *Polyporus berkleyi*, Framingham, Mass. (Frost). In *Polyporus versicolor*, South River, May 14, Riverton, May 5; in *Polyporus albellus*, Union, Sept. 12; on *Polyporus galactinus*, Union, Sept. 12; in *Polyporus betulinus*, Princeton Jc., May 8; in *Polyporus tsugae*, New Brunswick, N. J., Sept. 24.

Mycetophagus melsheimeri Lec. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Mycetophagus punctatus Say. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). Feeding in *Polyporus amorphus*, New Brunswick, N. J., July 26.

Mycetophagus pluriguttatus Lec. In *Daedalia confragosa*, New Brunswick, N. J., April 9.

Crosimus hirtus Casey. On *Daedalia quercina*, Monmouth Jc., N. J., June 12.

Litargus didesmus Say. On *Naucoria* sp., Framingham, Mass., July (Frost).

Family **Dermestidae.**

Attagenus piceus Oliv. In *Lenzites betulina*, New Brunswick, N. J., March 6.

Family **Histeridae.**

Hister unicus Csy. On *Clitocybe robusta*, Framingham, Mass., July (Frost).

Hister sedecimstriatus Say. On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost).

Hister abbreviatus Fab. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Hister interruptus Beauv. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Hister cognatus Lec. On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost).

Hister lecontei Mars. On *Polyporus dichrous*, *Polyporus versicolor*, Springfield, N. J., May 13, April 10; in *Polyporus albellus*, Union, N. J., Sept. 12; in *Polyporus hirsutus*, Monmouth Jc., N. J., April 29.

Family **Nitidulidae.**

Colastus truncatus Rand. In *Polyporus graveolens*, Monmouth Jc., N. J., April 9.

Epuraea ovata Horn. Feeding on *Lactarius* sp., Monmouth Jc., N. J., July 12; on *Polyporus cuticularis*, New Brunswick, N. J., October 1.

Nitidula bipunctata Linn. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Stelidota octomaculata Say. In *Polyporus chinoeus*, Springfield, N. J., Sept. 12.

Phenolia grossa Fab. On *Polyporus versicolor*, Swedesboro, N. J., June 30; breeding in *Polyporus sulphureus*, Springfield, N. J., Sept. 12; on *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost).

Omosita colon Linn. On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost).

Pallodes pallidus Beauv. Feeding on *Russula* sp., Lakehurst, N. J., July 17; feeding on *Collybia platyphylla*, Monmouth Jc., N. J., June 17.

Ips quadriguttatus Oliv. On *Polyporus betulinus*, Oradell, N. J., April 23; on *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). In *Polyporus cuticularis*, New Brunswick, N. J., Oct. 1.

Family **Trogositidae.**

Thymalus fulgidus Er. Breeds in *Polyporus betulinus*, *Daedalia confragosa*, Morristown, Oradell, High Bridge, Monmouth Jc., N. J.

Tenebrioides corticalis Melsh. On *Polyporus versicolor*, Union, N. J., May 8, June 27; in *Polyporus betulinus* and *Polyporus gilvus*, Princeton Jc., May 8, Sept. 12, N. J.

Family **Ptinidae.**

Eucrada humeralis Mels. Bred from *Polyporus gilvus*, Monmouth Jc., N. J., March 26.

Hemiptychus nigritulus Lec. In *Fomes applanatus* breeding in this fungus, Monmouth Jc., N. J., May 30, adults, pupae, larvae.

Caenocara oculata Say. On *Scleroderma vulgare*, Lakehurst, N. J., July 17.

Dorcatoma dresdensis Hbst. Reared from *Fomes fomentarius* in Wisconsin (Proc. Ent. Soc. Wash., X, 1908, p. 61).

Family **Bostrychidae.**

Endecatomus rugosus Rand. Breeds in *Polyporus gilvus*, Union, N. J., Sept 12, larvae, pupae, adults. In *P. gilvus*, Staten Island, N. Y. (Davis). In *Polyporus versicolor*, Springfield, N. J., March 20, June 27, September 12.

Family **Cisidae.**

Cis cylindrica Dury. In *Fomes pinicola*, Corvallis, Oregon, August 14 (W. J. Chamberlain).

Cis hirsuta Csy. In *Panus rudis*, Monmouth Jc., N. J., June 17.

Cis fuscipes Mell. Breeds in *Polyporus versicolor, Lenzites betulina, Polyporus hirsutus* in various parts of New Jersey. Feeding in *Polyporus conchifer*, Bound Brook, N. J., May 2.

Cis curtula Csy. In *Polyporus pargamenus*, Monmouth Jc., N. J., May 30. In *Polyporus cinnabarinus*, Richwood, N. J., June 30.

Cis wenzeli Dury. In *Polyporus cinnabarinus*, Centre Hall, Pa., May 26. Husted, Richwood, N. J., June 30. In *Polyporus versicolor*, Del. Co., Pa. (Jour. Cin. Soc. Nat. His., XXII, 2, 1917, p. 7).

Xestocis levettei Csy. In *Polyporus versicolor*, Milltown, N. J., May 18. In *Fomes applanatus*, Union, Monmouth Jc., N. J., May 30.

Xestocis moznettei Dury. Bred from *Polyporus* sp., Corvallis, Oregon, March 10 (Jl. Cin. Soc. Nat. His., XXII, 1917, pp. 1–28)

Brachycis brevicollis Csy. Breeds in *Polyporus gilvus, Fomes bakeri, Fomes igniarius*, Springfield, Monmouth Jc., High Bridge, N. J.

Ceracis sallei Mell. Breeds in *Polyporus gilvus, P. versicolor, P. hirsutus, P. dichrous, Fomes applanatus, F. igniarius, Lenzites betulina*, Springfield, Morristown, etc., N. J. In *Polyporus fumosus, Fomes lobatus, Polyporus curtisi*, Springfield, N. J., May, July.

Strigocis opacicollis Dury. In *Polyporus versicolor*, Swedesboro, N. J., June 30.

Sulcacis lengi Dury. Breeds in *Lenzites betulina, Polyporus versicolor, P. gilvus, P. hirsutus*, Monmouth Jc., June 10; in *Polyporus fumosus*, Springfield, N. J., May 13.

Ennearthron compacta Dury. Breeds in *Fomes marmoratus*, Key West, Fla. (Jour. Cin. Soc. Nat. His., XXII, 2, 1917, p. 22).

Ennearthron thoracicorne Ziegl. Breeds in *Polyporus gilvus, Lenzites betulina, Daedalia unicolor, Polyporus pargamenus, Polyporus fumosus*, Springfield, Monmouth Jc., N. J., April, May.

Ennearthron oblongus Blatch. In *Polyporus versicolor*, Orient, L. I., N. Y., April 1 (W. T. Davis).

Octotemnus denudatus Csy. Breeds in *Polyporus versicolor*, Oregon (Jour. Cin. Soc. Nat. His., XXII, 2, 1917, p. 27).

Octotemnus laevis Csy. In *Lenzites betulina*, Monmouth Jc., N. J., May 6, in *Polyporus versicolor*, Hunterdon Co., N. J., March 12.

Rhipidandrus paradoxus Beauv. Feeding on *Pleurotus ostreatus*, Monmouth Jc., N. J., June 10. In *Polyporus cuticularis*, New Brunswick, N. J., October 1.

Family **Scarabaeidae.**

Onthophagus hecate Panz. On *Polyporus versicolor*, Princeton Jc., N. J., May 8.

Geotrupes balyi Jek. On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost).

Geotrupes horni Blanch. On ground beneath *Lactarius* sp., Framingham, Mass., August (Frost).

Family **Tenebrionidae.**

Scotobates calcaratus Fab. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Xylopinus saperdioides Oliv. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Diaperis maculata Oliv. Feeding on *Clitocybe maxima*, Framingham, Mass. (Frost); on *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost); on *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain); feeding in *Polyporus albellus*, Springfield, N. J., July 10; on *Polyporus tsugae*, New Brunswick, N. J., Sept. 24; feeding on *Lentinus lepideus*, Monmouth Jc., N. J., July 7; breeds in *Polyporus betulinus*, Princeton Jc., N. J., April 23, May 8.

Hoplocephala bicornis Oliv. Feeds in *Polyporus hirsutus, P. versicolor, P. cinnabarinus* and *Lenzites betulina*, Springfield, New Brunswick, Husted, N. J., February, March, April, May, June.

Hoplocephala viridipennis Fab. In *Polyporus versicolor*, Springfield, N. J., March 13.

Platydema subcostatum Lap. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Platydema ellipticum Fab. Breeds in *Polyporus gilvus*, Springfield, N. J., Sept. 12.

Platydema ruficorne Sturm. In *Polyporus dichrous, P. lucidus*, Springfield, Plainfield, N. J., May.

Boletotherus bifurcus Fab. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). Breeds in *Fomes applanatus, Polyporus tsugae, Polyporus lucidus;* feeding on *Polyporus versicolor;* larvae during winter, adults during winter under bark. Plainfield, Barnegat, Union, Springfield, New Brunswick, Monmouth Jc., N. J., April, May, June, September, October.

Helops micans Fab. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Family **Melandryidae.**

Penthe obliquata Fab. On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost). On *Polyporus versicolor, P. betulinus*, Princeton Jc., N. J., May 8, April 23.

Eustrophus bicolor Say. Larva feeding on *Pleurotus sapidus, Polyporus squamosus, Poria* sp., *Polyporus albellus, Polyporus amorphus, Lentinus lepideus,* Monmouth Jc., Union, New Brunswick, N. J., May, June, July, September. On *Polyporus betulinus, P. versicolor, Daedalia confragosa,* Princeton Jc., N. J., April, May.

Hallomenus scalpularis Melsh. Occurs on *Polyporus sulphureus,* Indiana (Col. Ind., p. 1294).

Orchesia castanea Mels. Breeds in *Trametes suaveolens, Polyporus hispidus, Lenzites betulina, Lenzites saepiaria,* Kingston, Monmouth Jc., New Brunswick, N. J., April, May, June. In *Polyporus versicolor,* Union, N. J., June 27.

Family **Mordellidae.**

Tomoxia bidentata Say. On *Pleurotus ostreatus,* Cornwall, Conn., June 27 (Chamberlain).

Mordella marginata Melsh. Bred from *Lenzites saepiaria,* Uhlerstown, Pa., June 11.

Family **Anthribidae.**

Cratoparis lunatus Fabr:[1] In *Polyporus hirsutus, P. dichrous, P. betulinus, P. versicolor.* On *Polyporus brumalis, P. pargamenus, Panus rudis,* throughout N. J., April, March, June.

Order Thysanura.

Achorutes armatus Nicolet. Feeding on *Pholiota marginella,* Monmouth Jc., N. J., May 30.

Papirius pini Folsom. On various species of gill fungi. Monmouth Jc., N. J., Sept. 8.

Order Hemiptera.

Aradus similis Say. In and on *Polyporus betulinus,* in various parts of New Jersey. On *Fomes pinicola,* Centre Hall, Pa., May 28.

Order Lepidoptera.

Tinea cloacella Haw. Breeds in *Polyporus sulphureus, Polyporus tsugae, Fomes igniarius, Polyporus borealis,* Matewan, New Brunswick, High Bridge, N. J., overwinters as larva.

Tinea acapnopennella Clem. Breeds in *Polyporus tulipiferus,* N. J., August.

Hybroma servulella Clem. Bred from *Lenzites betulina,* New Brunswick, N. J., May 25.

Order Hymenoptera.

Cothonaspis, sp. Bred from *Polyporus lucidus,* Monmouth Jc., N. J., April 14.

Eubadizon, n. sp. Bred from cocoons found in larval and pupal chambers of *Boletotherus bifurcus* in *Fomes applanatus,* Springfield, N. J., May 26.

Trigonoderus, sp. Bred from *Polyporus versicolor,* Middlesex Co., N. J., March.

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[1] Euparius marmoreus Oliv., is latest name.

Trigonoderus unguttus Gir. Bred from *Polyporus gilvus*, Monmouth Jc., N. J., March 25.

Entedoninae, n. gen., n. sp. Bred from *Lenzites betulina*, Middlesex Co., N. J.

ORDER DIPTERA.

Limnobia cinctipes Say. Bred from *Polyporus dichrous*, Monmouth Jc., N. J., June 12.

Discobola argus Say. On *Polyporus albellus*, Union, N. J., Sept. 12. Dr. Dietz states that he has bred this from *Polyporus* sp.

Leia bivittata Say. Breeds in *Lenzites betulina*, *Polyporus tsugae*, *Polyporus lucidus*, New Brunswick, Springfield, N. J., May.

Sciara pauciseta Felt. Bred from *Polyporus dichrous*, Monmouth Jc., N. J., June 20.

Winnertzia, n. sp. Bred from *Lenzites saepiaria*, Plainfield, N. J., March 31.

Pseudotephritis vau Say. In *Lenzites betulina*, Middlesex Co., N. J., April 14. In *Polyporus hirsutus*, Monmouth Jc., May 5, N. J.

FUNGOUS HOST LIST.[1]

ORDER AGARICALES.

Family Polyporaceae.

Polyporus squamosus Hudson.
Eustrophus bicolor Say.

Polyporus brumalis Persoon.
Euparius marmoreus Oliv.

Polyporus betulinus Bulliard.
Mycetophagus flexuosus Say.
Ips quadriguttatus Fab.
Thymalus fulgidus Er.
Tenebrioides corticalis Melsh.
Diaperis maculata Oliv.
Penthe obliquata Fab.
Eustrophus bicolor Say.
Euparius marmoreus Oliv.
Aradus similis Say (Hemip.).

Polyporus berkleyi Fries.
Philonthus brunneus Grav.
Stilicus angularus Lec.
Tachinus pallipes Grav.
Mycetophagus flexuosus Say.
Hister sedecimstriatus Say.
Hister cognatus Lec.

[1] The name of each fungus is followed by the names of the insects associated with it. Insect names not followed by an abbreviation in parentheses belong to the Order Coleoptera.

Phenolia grossa Fab.
Omosita colon L.
Geotrupes balyi Jek.
Diaperis maculata Oliv.
Penthe obliquata Fab.

Polyporus sulphureus Buillard.
Hallomenus scapularis Melsh.
Phenolia grossa Fab.
Tinea cloacella Haw. (Lep.).

Polyporus fumosus Persoon.
Sulcacis lengi Dury.
Ennearthron thoracicorne Ziegl.

Polyporus amorphus Fries.
Eustrophus bicolor Say.
Mycetophagus punctatus Say.

Polyporus conchifer Schw.
Cis fuscipes Mell.

Polyporus tulipiferus Schw.
Tinea acapnopennella Clem. (Lep.).

Polyporus pargamenus Fries.
Cis curtula Csy.
Ennearthron thoracicorne Ziegl.
Euparius marmoreus Oliv.

Polyporus versicolor L.
Scaphidium 4-guttatum Say.
Megalodacne fasciata Fab.
Mycetophagus flexuosus Say.
Hister lecontei Mars.
Phenolia grossa Fab.
Tenebrioides corticalis Melsh.
Endecatomus rugosus Rand.
Cis fuscipes Mell.
Cis wenzeli Dury.
Xestocis levettei Csy.
Sulcacis lengi Dury.
Strigocis opacicollis Dury.
Octotemnus laevis Csy.
Octotemnus denudatus Csy.
Ennearthron oblongus Blatch.
Onthophagus hecate Panz.
Hoplocephala bicornis Oliv.
Hoplocephala viridipennis Fab.
Boletotherus bifurcus Fab.
Penthe obliquata Fab.

Eustrophus bicolor Say.
Orchesia castanea Mels.
Euparius marmoreus Oliv.

Polyporus hirsutus Wulf.
Hister lecontei Mars.
Cis fuscipes Mell.
Sulcacis lengi Dury.
Hoplocephala bicornis Oliv.
Euparius marmoreus Oliv.
Pseudotephritis vau Say (Dip.).

Polyporus dichrous Fries.
Hister lecontei Mars.
Ceracis sallei Mell.
Platydema ruficorne Sturm.
Euparius marmoreus Oliv.
Limnobia cinctipes Say (Dip.).
Sciara pauciseta Felt. (Dip.).

Polyporus borealis Fries.
Tinea cloacella Haw. (Lep.).

Polyporus chioneus Fries.
Mycotretus pulchra Say.
Stelidota octomaculata Say.

Polyporus albellus Peck.
Cercyon praetextatum Say.
Diaperis maculata Say.
Eustrophus bicolor Say.
Mycetophagus flexuosus Say.
Boletobius cinctus Grav.
Hister lecontei Mars.
Discobola argus Say (Dip.).

Polyporus galactinus Berk.
Mycetophagus flexuosus Say.

Polyporus cinnabarinus Jacq.
Cis wenzeli Dury.
Hoplocephala bicornis Oliv.
Cis curtula Csy.

Polyporus lucidus Leys.
Megalodacne fasciata Fab.
Platydema ruficorne Sturm.
Boletotherus bifurcus Fab.
Leia bivittata Say (Dip.).

Polyporus curtisi Berk.
Ceracis sallei Mell.

Polyporus tsugae Murrill.
Boletotherus bifurcus Fab.
Diaperis maculata Oliv.
Mycetophagus flexuosus Say.
Tinea cloacella Haw. (Lep.).
Leia bivittata Say (Dip.).

Polyporus graveolens Schw.
Colastus truncatus Rand.

Polyporus hispidus Bull.
Orchesia castanea Mels.

Polyporus gilvus Schw.
Scaphisoma repanda Csy.
Eucrada humeralis Mels.
Endecatomus rugosus Rand.
Brachycis brevicollis Csy.
Ceracis sallei Mell.
Sulcacis lengi Dury.
Ennearthron thoracicorne Ziegl.
Tenebrioides corticalis Melsh.
Platydema ellipticum Fab.
Ischyrus 4-punctatus Oliv.

Polyporus cuticularis Bull.
Megalodacne ulkei Crotch.
Rhipidandrus paradoxus Beauv.
Epuraea ovata Horn.
Ips quadriguttatus Oliv.

Fomes pinicola Swen.
Cis cylindrica Dury.
Aradus similis Say (Hemip.).

Fomes bakeri Murrill.
Brachycis brevicollis Csy.

Fomes fomentarius L.
Dorcatoma dresdensis Hbst.

Fomes igniarius L.
Brachycis brevicollis Csy.
Ceracis sallei Mell.
Tinea cloacella Haw. (Lep.).

Fomes lobatus Schw.
Ceracis sallei Mell.

Fomes applanatus Persoon.
Hemiptychus nigritulus Lec.
Xestocis levettei Csy.
Boletotherus bifurcus Fab.

Fomes marmoratus.
Ennearthron compacta Dury.

Trametes suaveolens L.
Orchesia castanea Mels.

Daedalia unicolor Bull.
Ennearthron thoracicorne Ziegl.

Daedalia confragosa Bolton.
Mycetophagus pluriguttatus Lec.
Thymalus fulgidus Er.
Eustrophus bicolor Say.

Daedalia quercina Linn.
Crosimus hirtus Csy.

Lenzites betulina Linn.
Attagenus piceus Oliv.
Cis fuscipes Mell.
Ceracis sallei Mell.
Sulcacis lengi Dury.
Ennearthron thoracicorne Ziegl.
Octotemnus laevis Csy.
Hoplocephala bicornis Oliv.
Orchesia castanea Mels.
Hybroma servulella Clem. (Lep.).
Leia bivittata Say. (Dip.).
Pseudotephritis vau Say (Dip.).

Lenzites saepiaria Fries.
Orchesia castanea Mels.
Mordella marginata Melsh.
Winnertzia, n. sp. (Dip.).

Poria, sp.
Ischyrus 4-punctatus Oliv.
Eustrophus bicolor Say.

Family **Agaricaceae.**

Schizophyllum commune Fries.
Endomychus biguttatus Say.

Pleurotus ostreatus Fries.
Pterostichus lucublandus Say.*
Necrophorus pustulatus Hersch.*
Staphylinus maculosus Grav.*
Oxyporus vittatus Grav.
Oxyporus lateralis Grav.
Oxyporus major Grav.
Oxyporus stygicus Say.
Tritoma thoracica Say.*
Tritoma flavicollis Lec.*

Mycetophagus flexuosus Say.*
Mycetophagus melsheimeri Lec.*
Mycetophagus punctatus Say.*
Hister abbreviatus Fab.*
Hister interruptus Beauv.*
Nitidula bipunctata Linn.*
Phenolia grossa Fab.*
Ips quadriguttatas Oliv.*
Rhipandrus paradoxus Beauv.
Scotobates calcaratus Fab.*
Xylopinus saperdioides Oliv.*
Diaperis maculata Oliv.*
Platydema subcostatum Lap.*
Boletotherus bifurcus Fab.*
Helops micans Fab.*
Tomoxia bidentata Say.*

Pleurotus sapidus Kalchb.

Megalodacne fasciata Fab.
Eustrophus bicolor Say.

Pleurotus ulmarius Fries.

Dacne 4-maculata Say.

Panus rudis.

Euparius marmoreus Oliv.
Cis hirsuta Csy.

Lentinus lepideus Fries.

Diaperis maculata Oliv.
Eustrophus bicolor Say.

Armillaria, sp.

Gyrophaena corruscula Er.
Tritoma bigŭtata Say.

Amanita, sp.

Philonthus cyanipennis Fab.
Tachinus fimbriatus Grav.

Collybia platyphylla Fries.

Philonthus cyanipennis Fab.
Tachinus pallipes Grav.
Tachinus fimbriatus Grav.
Pallodes pallidus Beauv.

Clitocybe illudens Schw.

Baeocera punctipennis Blatch.

Clitocybe robusta Peck.

Hister unicus Csy.

Clitocybe maxima G. and M.
Boletobius cinctus Grav.
Tritoma humeralis Fab.
Diaperis maculata Oliv.

Russula, sp.
Pallodes pallidus Beauv.

Lactarius, sp.
Staphylinus fossator Grav.
Epuraea ovata Horn.

Naucoria, sp.
Oxyporus vittatus Grav.
Litargus didesmus Say.

Pholiota marginella.
Achorutes armatus Nicolet. (Thys.).

Pholiota, sp.
Oxyporus lateralis Grav.

Psilocybe spadicea Fries.
Pterostichus adoxus Say.
Oxyporus 5-maculatus Lec.

ORDER LYCOPERDALES.

Family **Lycoperdaceae.**

Lycoperdon pyriforme Schoef.
Lycoperdina ferruginea Lec.

ORDER SCLERODERMATALES.

Scleroderma vulgare Fr.
Caenocara oculata Say.

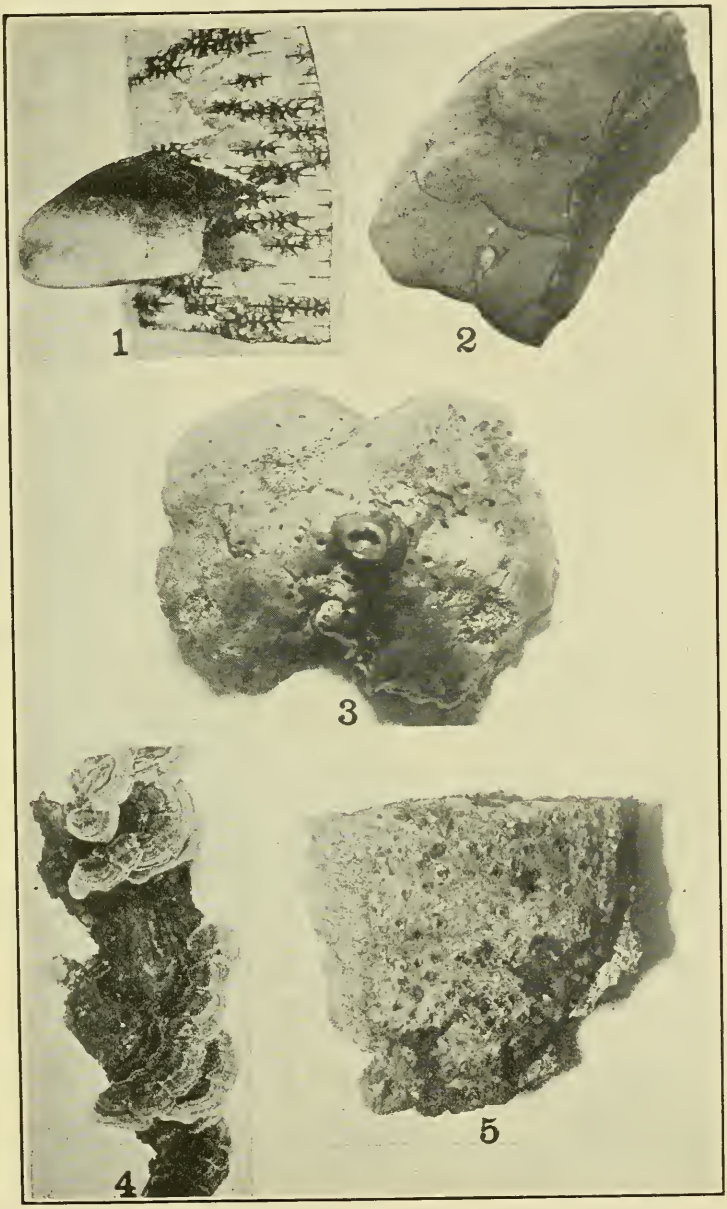
Table I summarizes the Coleoptera of the insect list. The 100 species mentioned are distributed in twenty families of which the *Staphylinidae, Cisidae* and *Tenebrionidae* each furnish a comparatively large number. This table also shows that most of the *Staphylinidae* were collected on gill fungi and most of the *Cisidae* on polypores and that the members of the other families appear to be equally at home on either group of fungi.

Table I

Family	*Total no. species on all fungi.*	*No. species found on polypores.*	*No. species found on gill fungi.*	*No. species on both.*	*On puffballs.*
Carabidae	2	.....	2	.....	.....
Hydrophilidae	1	1	.....	.....	.....
Silphidae	1	.....	1	.....	.....
Staphylinidae	14	3	11	.....	.....
Scaphidiidae	3	2	1	.....	.....
Endomychidae	5	.....	4	.....	1
Erotylidae	9	3	5	1	.....
Mycetophagidae	6	2	3	1	.....
Dermestidae	1	1	.....	.....	.....
Histeridae	6	3	3	.....	.....
Nitidulidae	8	3	2	3	.....
Trogositidae	2	2	.....	.....	.....
Ptinidae	4	3	.....	.....	1
Bostrychidae	1	1	.....	.....	.....
Cisidae	17	15	1	1	.....
Scarabaeidae	3	2	1	.....	.....
Tenebrionidae	10	4	4	2	.....
Melandryidae	4	3	.....	1	.....
Mordellidae	2	1	1	.....	.....
Anthribidae	1	.....	.....	1	.....
Totals	100	49	39	10	2

In the *Polyporaceae*, *Polyporus versicolor* appears to attract the most species, 23 having been found associated with this form. However, *Polyporus gilvus*, *P. albellus*, *P. dichrous*, *P. hirsutus*, *P. betulinus*, *P. berkleyi* and *Lenzites betulina*, are also beetle favorites. In the *Agaracaceae*, *Pleurotus ostreatus* was found to harbour 25 species. The 20 species marked by an asterisk under the name of this fungus were found in a single specimen on June 27 at Cornwall, Conn., by Mr. K. F. Chamberlain. The fact that this fungus is tougher and more persistent than most other gill fungi may account for its being a favorite.

Many of the gill fungi are attacked as soon as they appear above ground, while as a rule, the polypores may attain considerable growth, in fact


1
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5

many become full grown before becoming infested. Until additional data are secured, it is unwise to proceed further in a discussion of the relationship between insects and fleshy fungi or to draw any sweeping conclusions.

EXPLANATION OF THE PLATE.

Fig. 1. *Polyporus betulinus* on birch.
Fig. 2. A section of *Fomes applanatus*.
Fig. 3. *Polyporus lucidus*, lower surface showing insect apertures.
Fig. 4. *Polyporus versicolor*, a favorite with the Coleoptera.
Fig. 5. *Fomes igniarius*, a section showing insect injury.

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PROCEEDINGS
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A NEW UNSTALKED CRINOID FROM THE PHILIPPINE ISLANDS.

BY AUSTIN H. CLARK.

In a large collection of comatulids recently received at the Museum of Comparative Zoölogy from the Philippine Islands, Dr. Hubert Lyman Clark found two specimens of a new species of *Oligometrides* related to the Australian *O. adeonæ* which he has requested me to describe. It may be called

Oligometrides bellona, sp. nov.

Description.—Centrodorsal thin, discoidal, the dorsal pole flat or slightly convex, about 2.5 mm. in diameter, studded with well spaced and evenly distributed granular tubercles; within the circle of cirri is a more or less complete circle of empty cirrus sockets each with a more or less hemispherical median tubercle in the center.

Cirri XXIV, 21–23, about 13 mm. long; cirrus segments subequal, not quite so long as broad; on the third the proximal border is broadly thickened, this thickening on the fourth and following becoming a high transverse ridge with a sharp, straight crest which on the segments in the outer half of the cirri becomes, when the segments are viewed endwise, evenly convex, then gradually gable-like, and on the antepenultimate reduced to a single spine situated on the proximal edge of the segment; on some of the middle and outer segments of certain cirri midway between the proximal transverse ridge and the distal edge there is a transverse row of minute tubercles representing the distal transverse ridge in *O. adeonæ;* these, however, are not always present, and when present are inconspicuous.

Division series broad, thin, in lateral contact, the borders narrowly flattened against those of the plates on either side and therefore straight; synarthrial tubercles very prominent and sharp, slightly produced; IIBr series 2.

Arms 11 in number, about 100 mm. long, resembling those of *O. adeonæ.*

The pinnules are essentially similar to those of *O. adeonæ;* P_1 13 mm. long, rather stout, stiff, tapering evenly from the base to the tip, composed of fifteen segments, all but the first of which are longer than broad, the outer being about twice as long as broad; P_2 similar to P_1, 16 mm. long, but proportionately stouter and tapering more gradually, composed of fifteen or sixteen segments, of which the first is broader than long, the second is about as long as broad, and the following are longer than broad, mostly about twice as long as broad; P_3 similar to P_2 and of the same length or very slightly shorter, composed of fourteen or fifteen segments; P_4 similar to P_3, 12 mm. long with fourteen segments; following pinnules shorter and more flexible, with shorter segments; P_5 is 9 mm. long with twelve segments; distal pinnules slender, 13 mm. long with twenty-two segments.

Localities.—Southwest of Sorsogon Bay, Luzon, Philippine Islands 9–40 fathoms; cable repair ship "Rizal" (A. S. Day) September, 1912 (the-type-specimen, Cat. No. 705 M. C. Z.). Port Galera, Mindoro, April–June 1912; L. E. Griffin (Cat. No. 706 M. C. Z.).

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NEW SPECIES OF SPIDER CRABS FROM THE STRAITS OF FLORIDA AND CARIBBEAN SEA.[1]

BY MARY J. RATHBUN.

These species will be more fully described in a bulletin on American spider crabs in preparation. The two species of *Mithrax* belong to the group of *M. hispidus*[2] in which the carapace is broad-ovate and more or less lumpy and the marginal spines more or less complex, either with a secondary spine or accessory tubercles.

Mithrax caribbaeus, sp. nov.

Holotype.—Adult male, Cat. No. 50363, United States National Museum. Collected in the harbor of St. Thomas, West Indies, from piles near the town, by C. R. Shoemaker, July 7, 1915, and given to the National Museum by the Carnegie Institution.

Measurements.—Male holotype, total length of carapace 66.3 mm., width without spines 71.3 mm., with spines 78.4 mm.

Description.—On the postero-lateral margin there is a tubercle which forms the outermost unit of a transverse row of three tubercles on the dorsum, this row being subparallel to another anterior row of three tubercles. Rostral sinus U-shaped, about as wide as each horn; horns longer and less truncate than in *M. hispidus*. Two stout spines on anterior margin of arm. Crenulation of prehensile edges of fingers persisting in the old.

Mithrax tortugae, sp. nov.

Holotype.—Immature female, Cat. No. 50442, United States National Museum. Collected at the Tortugas, Florida, by W. H. Longley, 1917.

Measurements.—Female holotype, total length of carapace 19.7 mm., width without spines 22.1 mm., with spines 24.3 mm.

[1] Published by permission of the Smithsonian Institution.

[2] *Cancer hispidus* Herbst, Natur. Krabben u. Krebse, vol. 1, 1790, p. 245, pl. 18, fig. 100.

Description.—Carapace wider than in the allied species; no spine nor tubercle present on the postero-lateral margin; above the margin a row of two tubercles runs obliquely transversely backward from the spine at the lateral angle; first two antero-lateral lobes rectangular. Rostral sinus V-shaped, horns very wide. Two tubercles or blunt spines on anterior margin of arm.

Microphrys antillensis, sp. nov.

Holotype.—Male, Cat. No. 43017, United States National Museum. Collected off Montego Bay Point, Jamaica, June 28, 1910, by Dr. E. A. Andrews for the Museum.

Measurements.—Male holotype, total length of carapace 14 mm., length of horns 2.4 mm., width of carapace without spines 10.5 mm., with spines 11.6 mm.

Description.—Two processes on the antero-lateral wall of the carapace, the hepatic process having an anterior, outward-projecting tooth and the branchial process not rimmed nor sharply defined. Two adjacent branchial spines (paired), one near the lateral angle, the other in almost a transverse line. No lobe on margin of basal antennal article behind the antero-external spine.

Microphrys interruptus, sp. nov.

Holotype.—Male, Cat. No. 48753, United States National Museum. Collected at Ensenada de Cajon, off Cape San Antonio, Cuba, Station 11, May 22, 1914, by the *Tomas Barrera* Expedition, Henderson and Bartsch, naturalists.

Measurements.—Male holotype, total length of carapace 10.7 mm., length of horns 1.4 mm., width of carapace without spines 8.2 mm., with spines 8.4 mm.

Description.—The branchial region bears a high oblique elevation, divided in two, the anterior part elongate and bilobed at summit, the posterior part small and conical; in the same line is a stout, curved, sharp spine at the lateral angle of carapace; a conical tubercle in transverse line with the spine; a granulated, raised areole on either side of the cardiac region; a finely granulated, depressed areole at inner angle of branchial region. Cardiac and mesogastric regions nodulose; a transverse curve of 5 tubercles across the gastric region. An arch of 4 tubercles above the posterior margin; below it 2 smaller tubercles side by side. Carapace wider anteriorly than usual, orbits more tubular; preorbital tooth not produced.

Antero-lateral spine of basal article of antenna broad, flat, projecting obliquely outward; it is followed on the outer margin by a tuberculiform tooth; tubercle on ventral surface low, almost obsolete.

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PROCEEDINGS
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UNUSUAL TYPES OF APPARENT GEOGRAPHIC VARIATION IN COLOR AND OF INDIVIDUAL VARIATION IN SIZE EXHIBITED BY OSTINOPS DECUMANUS.[1]

BY FRANK M. CHAPMAN.

The identification of specimens of *Ostinops decumanus* from the Urubamba region of Peru has led to the discovery that all the specimens of this species in our collection from Peru and Bolivia, and most of those from Matto Grosso, southwestern Brazil, present a color character shown by only one of the considerable number of specimens of this species which I have seen from north of the Amazon.

Incidentally it was learned that the marked difference in size shown by males of this species from the same locality, which is apparently attributable to age, involves a striking difference not alone in the length but in the shape of the wing. The results of my studies of these two problems are presented below. I have to thank Mr. W. E. Clyde Todd for the loan of six specimens from Bolivia.

Variation in Color.

In general tone of color *Ostinops decumanus* shows but little variation throughout its wide range. Specimens from west of the Andes in Colombia and from Panama average blacker than those from east of the Andes and the Colombian form has been described by Mr. W. E. Clyde Todd as *Ostinops decumanus melanterus* (Proc. Biol. Soc. Wash., XXX, 1917, p. 3). Possibly the race may be valid, but I have been unable satisfactorily to separate Colombian from Dutch Guiana specimens, as before remarked (Bull. A. M. N. H., XXXVI, 1917, p. 624).

[1] Published by permission of the Trustees of the American Museum of Natural History.

Specimens from Trinidad are said by Bangs and Penard to show an excess of chestnut edgings to the feathers, particularly posteriorly, and according to these authors (Bull. M. C. Z., LXIII, 1919, p. 38) should be referred to *Ostinops decumanus insularis* Dalmas, of Tobago. Paria Peninsula birds are also strongly margined with chestnut posteriorly, but a Tobago male is darker and has as little chestnut as a male from Paramaribo. (See also in this connection, Hellmayr, Nov. Zool., XIII, 1906, p. 19.)

Bolivian specimens are intermediate between those from Colombia and the Paria Peninsula and a series from Chapada, Matto Grosso, is of a browner tone than those from Bolivia. Possibly several races, distinguished by such differences of degree as I have here briefly referred to, may in time be recognized, but in the absence of adequate series from Tobago, Trinidad, and the Guianas, I am not in a position to deal with this phase of the subject.

The 108 specimens of *Ostinops decumanus* which I have examined, and of which 102 are contained in our Museum collections, do show, however, that in southern Peru, Bolivia, and southwestern Brazil, this species is subject to a variation of which a slight trace is shown by only one of our 44 specimens from the Amazon northward.

In brief, this variation consists of the presence in varying numbers and scattered more or less irregularly throughout the plumage of the body and wing-coverts, of feathers which are wholly or in part yellow and rarely white. Presented in a single individual, or even a number of individuals, such variation would be considered as pathological and termed albinistic or xanthochroic. Dr. Allen, for example, in commenting on its occurrence in a series of birds from Matto Grosso said: "It is evidently an abnormality analagous to albinism." When, however, it is exhibited by a large proportion of the birds from a wide area and by every bird in a large series from an extended area, it presumably cannot be considered as adventitious but is apparently the result of a cause or causes which are or have been operative over an extensive region. Whether this variation may be attributed to environmental influences, past or present, to atavism or to mutation, I am unable even to surmise; it is, however, clearly not individual, but apparently racial, and as such, in spite of its variability and unlikeness to those differentiations of degree which are so commonly associated with climate, the birds occupying the area in which it occurs should, in my opinion, be distinguished by name from those inhabiting a region in which this variation is practically unknown. Hence, as a means of giving a "handle to this fact," I suggest naming the form of *Ostinops decumanus* found in southern Peru, Bolivia and Matto Grosso, of southwestern Brazil,

Ostinops decumanus maculosus, new subspecies.

Subspecific characters.—Similar to *Ostinops decumanus decumanus* (Pall.), but averaging smaller and with a shorter bill, the general tone of coloration browner and with a variable number of feathers wholly or in part

yellow, less frequently yellowish white and rarely white, distributed irregularly through the plumage of the body and wing-coverts.

Type.—No. 138547, Am. Mus. Nat. Hist., ♂ ad., Yungas (alt. 3600 ft.), Prov. Cochabamba, June 3, 1915; Miller and Boyle.

Consideration of Material Examined.

Bolivia.—Yungas, alt. 3600 ft., Prov. Cochabamba, 5 ♂♂, 5 ♀♀; Locotal, alt. 5800 ft., Prov. Cochabamba, 2 ♀♀; Todos Santos, alt. 1300 ft., Prov. Cochabamba, 2 ♂♂; Mission San Antonio, Rio Chimoré, Prov. Cochabamba, 1 ♂; Tres. Arroyas, Rio Espiritu Santo, 1 ♂; Beni River, 1 ♂; Buenavista, Prov. Sara, 2 ♂♂; Santa Cruz de la Sierra, 1 ♂; Puerto Suarez, Brazilian boundary, 3 ♀♀.

The singular character which, chiefly, distinguishes this proposed race, is evidently most highly developed in the territory at the base of the Andes in Bolivia (Yungas, Locotal, Todos Santos, Buenavista, Santa Cruz). Every one of twenty-one specimens (13 males, 8 females) from this region is more or less conspicuously marked with feathers in whole or part yellow, yellowish white, or rarely white. The specimen selected as type, for example, has yellow or yellow-tipped feathers in the nape, scapulars, interscapulars, greater coverts of the left wing, rump, throat, breast and abdomen. In all there are some sixty feathers of this character.

In a varying degree all the remaining twenty-one specimens in this series exhibit similar characters, which are apparently more highly developed in the male than in the female. Of thirteen males, twelve have yellow or partly yellow feathers in the scapulars or inner tertials on both sides. There is here, therefore, a degree of symmetry in this marking which does not, however, obtain in connection with the yellow feathers of the body plumage.

Three females from Puerto Suarez, some 350 miles east of Santa Cruz de la Sierra, on the Brazilian boundary, exhibit the browner tone of coloration which appears to characterize the Matto Grosso birds, but a single yellow-tipped feather on the breast of one is the only evidence shown of the type of marking which forms the subject of this paper.

Peru.—(Rio Cosireni, 3000 ft., lower Urubamba region, 1 ♂; Chauillay, Urubamba Cañon, 1 ♂.) The Rio Cosireni specimen has yellow or yellow-tipped feathers in the nape, back, scapulars, rump, throat, breast, flanks, and tibiæ. In the Chauillay bird they appear only in the lower breast and abdomen. These two birds, unfortunately the only ones available from Peru, indicate the disappearance of the "pied" character as one advances northward. Toward the east, from what appears to be its center of highest development, Yungas, Bolivia, it persists more strongly, as shown by a large series from Matto Grosso.

Southwestern Brazil.—Chapada, Matto Grosso, 16 ♂♂, 13 ♀♀; Urucum, near Corumbá, Matto Grosso, 2 ♂♂; 2 ♀♀.) This series of thirty-three specimens exhibits as a whole a certain brownish tone which distinguishes it from all our remaining specimens of the species. Possibly

the color may be in part attributable to the age of a large part of our specimens (collected at Chapada, in 1882–85), though it is exhibited in a degree by specimens collected at Puerto Suarez in 1908, and at Urucum in 1913. However, I should prefer seeing a large series of freshly collected birds before commenting further on their general colorations. These birds further differ from our other specimens in being smaller, with shorter bills, presenting, indeed, in these respects, the minimum measurements of our entire series.

We are, however, here concerned chiefly with the extent to which this series of birds shows the "pied" character which distinguishes our series from Bolivia. Thus, seventeen of eighteen males, and nine of the fifteen females are marked with feathers in whole or in part yellow. The feathers are never as numerous as they are in our birds from the Andean region of Bolivia, and it is evident that the pied character is disappearing. This, it seems to me, is less surprising than that it should be present in so large a percentage of the specimens in a region over four hundred miles from what appears to be the region of its greatest development.

Amazon River (Solimoës, near Manaos, 1 ♂; Santarem, 3 ♂♂; Rio Tocantins, 1 ♀; Marajo, 1 ♂).—These specimens are obvious intergrades between what may be loosely called the northern and southern forms. In general black tone of color they are nearer the former, in size they are fairly intermediate, while four of the six birds exhibit traces of the pied markings found in most of our southern specimens. The Solimoës bird has a single breast-feather broadly tipped with yellow, and of the three Santarem birds, one has three breast-feathers, the other, one narrowly fringed with yellow. The Marajo bird has one yellow feather and one broadly tipped with yellow on the breast. On the whole, these Amazon birds are to be referred to *decumanus* rather than to *maculosus*.

North of the Amazon (Dutch Guiana, 3 ♂♂; British Guiana, 1 ♂, 1 ♀; Tobago, 1 ♂; Venezuela, 6 ♂♂; Ecuador, 1 ♂, 1 ♀; Colombia, 6 ♂♂, 11 ♀♀; Panama, 10 ♂♂, 3 ♀♀).—As before stated, lack of adequate topotypical material prohibits a report on the variation of these specimens *inter se* and I consider them here only with regard to the pied marking which characterizes the southern form.

Of the forty-four specimens here listed only one shows any evidence of this marking, a male from Cristobal Colon, Paria Peninsula, Venezuela, having one breast-feather lightly fringed and one almost imperceptibly margined with paler yellow. It is therefore the practical absence of these yellow feathers north of the Amazon as well as their presence south of the Amazon, which indicates that they constitute a character of racial value.

Variation in Size.

Examination of the measurements of a considerable number of specimens, shows that while females from the same locality present a comparatively small range of variation in size, the males vary widely. Fur-

ther study indicates that the variation in size in the male is apparently attributable primarily to age, and that this fact must be given due consideration in selecting material to determine the geographical variations of the species in size.

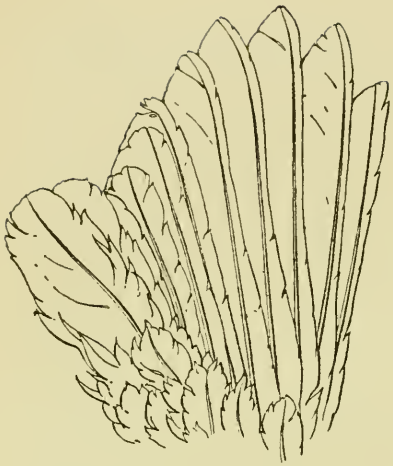
Variation with age.—In a series of seven males from Colombia, it was found that in birds which appeared to be mature, the wing varied from 199 to 249, the tail from 167 to 210 mm. in length. Twelve Bolivian males showed a corresponding variation of 199 to 245 and 157 to 193 mm., and in eleven males from Chapada, Matto Grosso, these measurements were, respectively, 195 to 239 and 156 to 188 mm. It appears that the variations in the length of the wing are due chiefly to the greater length of the primaries, while those in the tail are mainly attributable to the greater length of the yellow feathers. The wing variation is of a nature to create a decided difference in the shape of the wing, the longer wings being "pointed" with considerable difference in the relative length of the outer primaries, the shorter wings being more "rounded" and with the outer primaries more nearly equal in length. The difference between the two types of wings would commonly be called generic in character.

Although it is not usual to find such a pronounced variation between first winter birds and those fully adult, it seems probable that the birds with comparatively short wings and tail are first winter birds, those having longer, pointed wings being mature birds. Furthermore, the fact that both wings and tail in *Ostinops* are to some extent secondary sexual characters, being used in the remarkable display which this bird makes in the breeding season, may make them in a measure subject to such variation in development as is shown by crests, ruffs, spurs and other secondary sexual characters.

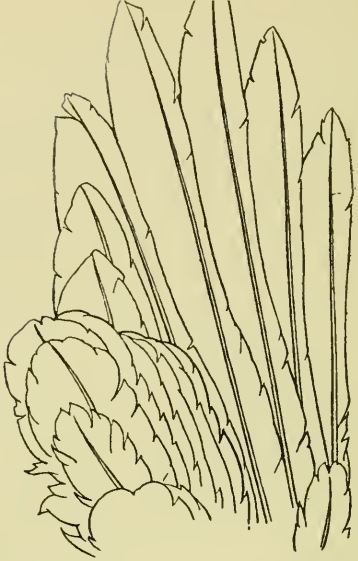
The accompanying figures, illustrating the wings of birds from both Colombia and Matto Grosso, make a detailed description of this variation unnecessary, but attention may be called to the marked difference in the width and outline of the outer web of the third and, especially, fourth primaries (from without).

Geographical Variation.—Using only material which appears to be comparable as regards age, our series indicates that maximum size in *Ostinops decumanus*, especially in the bill, is reached in the Paria Peninsula, of Venezuela; minimum size in the Province of Matto Grosso, Brazil, where the culmen in seven birds averages 56.1 mm., as compared with 71 mm. in three birds from the Paria Peninsula. Colombia birds agree in length of wing and tail with those from the Paria Peninsula, but specimens from Chiriqui, at the northern limit of the bird's range, are somewhat smaller.

Males seem to show greater geographic, as well as greater individual variation than females. The results of the study of our material may be briefly summarized in the following:

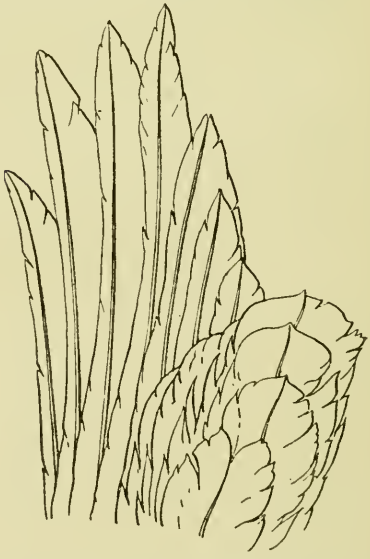


Wing of first winter bird. No. 32807, A. M. N. H., ♂, Chapada, Matto Grosso, Brazil, Feb. 26, 1885; H. H. Smith.



Wing of adult bird. No. 32814, A. M. N. H., ♂, Chapada, Matto Grosso, Brazil, Aug. 14, 1882; H. H. Smith.

Wing of first winter bird. No. 134528, A. M. N. H., ♂, Peque, Antioquia, Colombia, Feb. 4, 1915; Miller and Boyle.



Wing of adult bird. No. 113186, A. M. N. H., ♂, Rio Frio, Cauca, Colombia, Nov. 24, 1911; A. A. Allen and Leo E. Miller.

WINGS OF MALE OSTINOPS DECUMANUS, TO SHOW OUTER PRIMARIS.
(Reduced.)

Note short outer primaries and "rounded" wings of birds in first winter plumage and long outer primaries and pointed wing of adult birds.

Conclusions.

First.—Practically all male, and most female specimens of *Ostinops decumanus* from south of the Amazon exhibit a varying number of feathers which in whole or part are yellow, yellowish and rarely white. The presence of these feathers produces a pied appearance which in an individual specimen would be considered abnormal, but which in the present instance seems to be of racial significance.

Second.—This pied character is practically absent north of the Amazon.

Third.—*Ostinops decumanus* reaches its maximum size in northern South America from northeastern Venezuela to Colombia; its minimum size at the southern limit of its range. Specimens from the northern limit of the bird's range are intermediate in size but nearer those from Colombia.

Fourth.—Males are more variable in size, both individually and geographically, than females.

Fifth.—The wings and tail in adult males vary markedly both in size and shape from those of less mature birds, the difference being in part due to age, in part to sexual causes.

Sixth.—The species may be further divided into geographic forms based upon degrees of difference in general coloration, but the material at hand does not warrant definite expression of opinion in this connection.

Measurements of Adult Males.

Locality.	*Wing.*	*Tail.*	*Culmen.*
Chiriqui, Pan....(5)	218–231; av. 229	184–200; av. 192	60–64; av. 62.2
Colombia.....(5)	228–249; av. 237	188–210; av. 195	63–66; av. 64.7
Paria Pen., Ven..(3)	231–241; av. 234	195–198; av. 196	70.5–71; av. 71.0
Tobago.....(1)	201	186	65
British Guiana...(1)	201	177	61.5
Dutch Guiana....(1)	233	183	64
Marajo, Brazil...(1)	218	167	60
Santarem, Brazil.(1)	224	173	58
Solimoës, Brazil..(1)	228	182	58
Napo, Ecuador....(1)	247	212	65
Bolivia.....(9)	222–245; av. 230	156–193; av. 180	56.5–62; av. 59.4
Chapada, Brazil..(7)	205–239; av. 220	165–181; av. 173	54–59.5; av. 56.1

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DESCRIPTION OF A NEW CLAPPER RAIL FROM FLORIDA.

BY HARRY C. OBERHOLSER.

A clapper rail obtained by Dr. Paul Bartsch on his recent trip to the Florida Keys proves to belong to an undescribed race which may be called

Rallus longirostris helius, subsp. nov.

Mangrove Clapper Rail.

Chars. subsp.—Similar to *Rallus longirostris scotti* from western Florida but much lighter both above and below, the edgings on the upper parts much less olivaceous (more clearly grayish).

Description.—Type, adult male, No. 255254, U. S. National Museum; sixth key in the Newfound Harbor group, southwest of Big Pine Key, Florida, May 12, 1919; Dr. Paul Bartsch. Pileum olive brown, the centers of the feathers darker; hind neck between Saccardo's umber and sepia, mixed with grayish feather edgings, which posteriorly impart a streaked appearance; back and scapulars with the feathers centrally sepia, marginally clear gray; rump and upper tail-coverts sepia with broad, dull, olive gray feather margins; tail between olive brown and fuscous, the shafts of the rectrices clove brown; wings dark olive brown, the outer and inner edges of the quills lighter, the superior coverts still lighter and inclining to cinnamon, the inner coverts washed with grayish; outer web of outermost feather of alula mottled and partly edged with pale cinnamon; sides of head rather dark neutral gray, the lores darker and more brownish, the supraloral stripe and line on the lower eyelid dull white; sides of neck light neutral gray washed with buffy, posteriorly darker, less purely gray and indistinctly streaked with dull brown; chin and throat white; malar stripe pale ochraceous buff; center of jugulum and whole of breast, between pinkish buff and pinkish cinnamon, the middle of breast paler; abdomen dull, buffy white; sides of body and flanks rather dark brownish gray, broadly barred with white; lower tail-coverts white, widely barred

with dark brownish gray; lining of wing rather dark hair brown, outwardly washed with rusty, and narrowly barred with white; thighs anteriorly dull white, posteriorly mouse gray. Wing, 147 mm.; tail, 64; exposed culmen, 62; tarsus, 50; middle toe without claw, 45.

This interesting new rail is in color between *Rallus longirostris crepitans* and *Rallus longirostris waynei*, although it is smaller than either. It is apparently confined to the Florida Keys, although it possibly may extend to the adjacent mainland. Its northeastern distribution yet remains to be determined.

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NOTES ON THE LIFE HISTORY OF EUREMA LISA (BOISDUVAL AND LECONTE).

BY ARETAS A. SAUNDERS.

The notes on which this paper is based were made nineteen years ago. I have withheld them from publication mainly because of the fact that when they were made I was but a boy in high school, knowing nothing of how such things might be published. Since then my interests have been ornithological rather then entomological, and the notes have lain almost forgotten among a stack of other papers. Having recently unearthed them, and being convinced of their accuracy and importance, I venture to submit them.

Discussing the life history of the Little Sulphur Butterfly (*Eurema lisa*) Scudder, after giving his experiences in raising it, says:[1] "It scarcely seems possible that the earliest produce of the second brood can reach maturity in season out-of-doors to give birth to butterflies before such cold frosty nights would come as would kill the newly emerged butterflies. Still it would appear that it is probably by this small chance of life that this butterfly maintains its foothold in the warmer nooks of New England." That this probability is fact, and that the chances are greater than Scudder supposed, are the points which I believe my notes reveal.

On August 10, 1900, at New Haven, Conn., I followed a female Little Sulphur as it laid its eggs, and secured eight of the latter. They had been laid on leaves of the Partridge Pea (*Cassia Chamaecrista*). I uprooted a small plant, with one of the eggs on it, took it home and potted it, that my caterpillars might have fresh food. I placed the plant and eggs on the sill of an open window, where they might have conditions as much like out-of-doors as possible, and proceeded to watch them and

[1] Everyday Butterflies, pp. 349–350.

keep notes. I did not use a breeding cage, but left the plant entirely open, trusting that my caterpillars would not leave the food plant. Five of the eight were lost when so small that it was difficult to follow their movements, but the other three grew to maturity, passed through all stages and became butterflies.

The eggs hatched August 13, three days from the time they were laid. The caterpillars hung for the chrysalis August 28 and 29, and the chrysalids were formed August 29 and 30, after fifteen to sixteen days in the caterpillar stage. The chrysalids showed first change of color on September 2 and 3, and the butterflies emerged September 4 and 5, after only seven days in the chrysalis. These periods are all remarkably shorter than those given by Scudder who gives for the egg, six days; for the caterpillar, one month; and for the chrysalis, thirty to thirty-eight days.

The conditions under which the caterpillars grew were, I believe, very nearly natural ones. The caterpillars were kept on the sill of an open, though screened window, on the south side of the house, where they obtained sunshine during the greater part of the day. When the chrysalids were formed I moved them, and fastened them to the wall of the room a few feet from the open window. There was no artificial heat in the room, and none in the house except a kitchen stove on the floor below, and on the opposite side of the house. The weather, during the time of the egg stage, was unusually hot. I have no notes or memory on weather conditions during the rest of the time.

At the time my butterflies emerged from their chrysalids, butterflies of this species were still flying out-of-doors, and caterpillars only a few days old were easily found. I believe that the earlier butterflies of the second brood to appear, can and do produce a third brood, which comes early in September; that this brood appears while the second brood is still flying; and that it is through these earlier butterflies that the species is able to exist in southern New England. The differences in the time occupied by the early stages, shown when Scudder's observations are compared with mine, is simply due to weather conditions. Those insects that pass through the early stages in mid-August encounter decidedly warm weather, while those that wait until late August and September meet colder conditions and develop more slowly.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW SPIROBOLOID DIPLOPODS FROM AUSTRALIA.

BY RALPH V. CHAMBERLIN.

A diplopod collected in California on Stag-Horn Fern from Australia and sent to me for identification by H. L. Sanford, of the Federal Horticultural Board, appears to be an undescribed species representative of a new genus. In the same genus apparently falls a second undescribed species represented in the collections of the Museum of Comparative Zoölogy by a female taken at Southerland, New South Wales, Australia, by Prof. W. M. Wheeler. The new genus is nearest to *Spirobolellus*, species of which occur commonly in the Australian and East Indian regions.

Strophobolus, gen. nov.

In general resembling *Spirobolellus* but differing in the structure of the male gonopods. The ventral plate of the anterior pair strongly triangularly narrowed distad, the distal end subacutely rounded, not incised as in *Spirobolellus*. The coxal pieces of anterior gonopods broad at base, narrowing to middle and with distal part of nearly uniform width or a little clavately widening, truncate. Telopodite narrowest at middle, distally much broader than coxa beyond which it much extends, bent mesad, the two members in contact at median line in genotype, the distal edges being long and straight. Posterior gonopod plate-like, narrowest at middle above which subclavate and at end truncate; two short, spinous projections close together and just proximad of the distomesal angle. Each segment with encircling furrows as in *Spirobolellus*, lacking a true sulcus, the pore on metazonal region. Clypeal foveolae 4 + 4 or 5 + 5.

Genotype.—*Strophobolus immigrans*, sp. nov.

Strophobolus immigrans, sp. nov.

Dorsum with a broad longitudinal stripe of orange color geminate by a narrow median black stripe and limited laterally by the black of each side. Venter yellow of orange cast, the light color extending part way up the side on each metazonite. Collum black, the median region with obscurely lighter areolations as common in related forms. Legs yellowish of slight orange cast. Antennae dusky over a fulvous ground.

Vertigial sulcus weak, in a slight depression. Sulcus again evident over lower part of clypeus. Antennae short; sensory cones four. Ocelli numerous, distinct, in five subvertical series, *e. g.*, 9, 9, 9, 6, 2.

Collum narrowed down each side, each end rounded. Margined below and up the front but otherwise not striate. Second tedgite not extending below its level and not produced beneath it. This segment strongly striate beneath like the following ones.

Segments in general with the encircling furrow rather deep and distinct. Pore widely removed from the furrow. Truly longitudinally striate only beneath but prozonite with weaker lines curving forward and upward from the furrow on the sides. Particularly in the dorsal region with lunate and semicircular impressions along the furrow or near it, their concavities mostly caudad. Metazonites smooth.

Anal tergite caudally rounded, not at all projecting, the valves extending beyond it. Valves with mesal borders bulging, rounded, not at all marginate.

In the male the coxae of the third to seventh pairs of legs flattened and extended ventrad in low, rounded or subconical elevations.

Number of segments (♂), forty-four.

Length, near 20 mm.; width, 2 mm.

In addition to the type, an adult male, there is an immature individual of twenty-seven segments and a length of 8.5 mm. Its coloration is nearly as in the adult.

Strophobolus australianus, sp. nov.

A larger and more robust form than the preceding. Coloration nearly the same, the body being conspicuously marked by a longitudinal dorsal stripe of orange color divided by a median black line. Sides black, less encroached upon by the light color from below than in immigrans.

Sulcus distinct across vertex and again over the clypeus, on the latter more sharply impressed. Antennae very short, Clypeal foveolae 4 + 4. Ocelli larger and fewer than in the genotype, in four series, *e. g.*, 8, 7, 7, 5.

Collum nearly as in preceding species. Second tergite extending below it.

Segments with longitudinal striae beneath and a little way up each side, farther than in the preceding form, these striae on lower part of sides extending through furrow and then curving forward and upward. On the upper part of the sides the striae begin at or in the furrow and then curve similarly forward and upward. Prozonite marked on dorsum

by numerous lunate and semicircular impressions in and along and also in front of the furrow, being more abundant than in *immigrans* and also rather more pronounced.

Anal segment as in the preceding form, but the valves rather less convex.

Number of segments (♀), forty-seven.

Length, 31 mm.; width, 2.7 mm.

Locality.—Australia: N. S. W.: Southerland. (Prof. W. M. Wheeler, September 14, 1914.) Type, M. C. Z., 4,842.

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PROCEEDINGS
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A NEW DIPLOPOD FROM TEXAS AND A NEW CHILOPOD FROM ALASKA.

BY RALPH V. CHAMBERLIN.

In a miscellaneous lot of myriopods sent to me for identification by E. W. Nelson, chief of the Bureau of Biological Survey, appear two previously undescribed forms, one a *Geophilus* from Alaska, and the other a second species of the genus *Ethojulus*, recently established by the writer for a Louisianan species, *E. amphelictus* Chamb.[1] In publishing descriptions of these new forms it seems worth while to list the other species in the lot for the sake of the records.

DIPLOPODA.

1. **Fontaria virginiensis (Drury).**

One immature female taken at Falls Church, Va., 24 August, 1919, by L. O. Jackson.

2. **Polydesmus serratus** Say.

Two adult males and one female taken at Painesville, Ohio, September, 1918, by E. R. Kalmbach.

3. **Parajulus impressus** Say.

One male taken from the crop of a lesser yellow-legs, *Totanus flavipes* (Gmel.) at Washington, D. C., 31 August, 1893.

4. **Parajulus,** sp.

An incomplete specimen taken at Lake Wanitha, McHenry, North Dakota, 22 August, 1917, by D. C. Mabbott.

5. **Ethojulus cyaneus,** sp. nov.

The general color typically obscure dark blue with a narrow pale stripe across each metazonite; anal segment and especially the head, collum and

[1] Canadian Entomologist, Nov., 1918, p. 361.

the second and third segments contrasting in being of dark brown or chestnut color wholly lacking the blue tinge. Legs brown or chestnut. Antennae darker brown. Under the lens the collum shows the usual light areolations as do the second and third tergites and the vertex of head. The usual darker band between eyes enclosing two lighter spots below at level of antennae. Clypeal region lighter.

In the female the collum is narrowed down each side. In the male it is much elongate as usual in *Parajulus*, with the lower margin on each side long and straight. The middorsal length about equalling the combined length of the next two and a half or three segments when not coiled. Margined below and up the anterior corner but otherwise not striate. Second tergite in the female extending below level of collum with anterior edge lowest; but in the male the lower edge of the second tergite is straight and on a level with that of the collum.

Second tergite above lower edge with typically four longitudinal striae and a shorter isolated one farther dorsad, this more pronounced on the third tergite. On the following segments the number of striae increases, the series extending halfway up the side but not attaining the level of the pore by a considerable space. These longitudinal striae deep, crossing only the metazonite. On the prozonite in front of them are fewer striae, similarly pronounced, which curve dorsad and cross the dorsum as transverse striae normally mostly covered by the preceding metazonite in each case. Segmental suture strongly marked, conspicuously angled at level of pore which lies in line with its straight portion.

Anal tergite acutely produced beyond the valves behind, the cauda straight. Anal valves not margined.

Legs in general rather long and slender.

In the male the first legs are enlarged and strongly crassate, the metatarsus long and straight, flattened beneath. Second legs of the male reduced; the coxae enlarged and produced forward in a slender, linguiform, straight process which extends to the gnathochilarium, slightly narrowing distad.

Cardo of mandibles in the male strongly produced ventrad, the process subacute below, attaining level of edge of labrum.

The gonopods have the general configuration of those of *E. amphelictus*. First branch of anterior pair of ordinary texture, narrowly ovate above the constricted base, strongly setose. Second branch strongly chitinous and smooth, a broad thin plate at base abruptly narrowing into a slender blade which extends ventrad with weakly sigmoidal or sinuous flexure, distally bending abruptly mesad and then caudad; without processes or spurs. The posterior gonopods are broad blades curving forward in contact with body, then ventrad and finally at ends mesad toward each other; secondary spur or blade of each extending straight ventrad, slender and acute, long, much as in *amphelictus*.

Number of segments, fifty-four (male type).

Length about 45 mm.; width, 2.8 mm.

Locality.—Texas: Bay City. A. Wetmore coll., 1 January, 1918.

Obviously different in coloration from the genotype in its dark blue color and the lack of contrast between dorsum and lower part of sides and venter, and the lack of pronounced pattern. It differs very clearly in the details of the gonopods of the male; *e. g.*, in the spur to the posterior blades of the first pair, with distal ends extending mesad instead of first mesad and then abruptly caudad, and in the much broader posterior blades at distal ends bending mesad toward each other instead of caudad, etc.

6. **Spirobolus marginatus** (Say).

Two females taken at Painesville, Ohio, 1 September, 1918, by E. R. Kalmbach.

CHILOPODA.

7. **Hemiscolopendra punctiventris** (Newport).

One specimen taken on James Island, South Carolina, 6 April, 1919, by E. R. Kalmbach.

8. **Geophilus ethopus,** sp. nov.

Color fulvous of a slight orange tinge toward ends.

Cephalic plate broad, but little longer than wide (about 11:01). Widest half-way between middle and anterior end. Anterior border very obtusely angular. Caudal margin wide, truncate or very slightly excurved. No frontal suture. Rather coarsely and densely punctate.

Prebasal plate not exposed, the basal plate being overlapped by the cephalic. Exposed portion of basal plate with width four and a fourth times the median length. Claws of prehensors when closed about equalling anterior margin of head. Prosternum and joints of prehensors unarmed.

Dorsal plates bisulcate, the sulci rather wide and shallow, posteriorly indistinct.

Anterior sternites with a deep median longitudinal sulcus, becoming shallower in going caudad, not obvious in middle and posterior regions.

First spiracles large, subcircular, being somewhat angled. All other spiracles strictly circular, the second ones abruptly much smaller than the first, the decrease in size of the others being very gradual in going caudad.

First legs only a little shorter and more slender than the second. Legs of anterior region in general much shorter than those of the posterior region.

Last ventral plate narrow, parallel-sided, much longer than wide (about 3:2); caudal margin straight or a little incurved. Coxopleurae with numerous small and moderate pores.

Anal legs of male conspicuously crassate, the last two articles rather abruptly less so than the others. Armed with a small straight claw.

Pairs of legs of male type, forty-one.

Length, 35 mm.

Locality.—Alaska: Iditarod, June, 1918, collected by A. H. Twitchell.

Geophilus alaskanus Cook, described from Sitka, Alaska, is a somewhat similar species. It differs in its deeper, Linotaenia-like coloration, in having the last ventral plate trapeziform and nearly as wide as long, in the fewer coxopleural pores, more numerous legs, smaller first legs, and in having the anal legs of male not truly crassate with claws of nearly normal size.

9. **Gosibius arizonensis** Chamberlin.

One adult female taken at Flagstaff, Arizona, 7 October, 1916, D. A. Gilchrist.

10. **Ezembius stejnegeri** (Bollman).

One specimen apparently this species, taken in the Iditarod region, Alaska, 27 July, 1917, A. H. Twitchell.

11. **Neolithobius mordax** (Koch).

A male taken at Bay City, Texas, 1 January, 1918, by A. Wetmore.

12. **Neolithobius,** sp.

Two specimens were taken from the crop of an eared grebe, *Colymbus nigricollis californicus* (Brehm), collected at St. Xavier, Montana, 31 May, 1917. They are in too poor a condition for certain identification.

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PROCEEDINGS
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NINE NEW PLANTS OF THE GENUS STYLOSANTHES.

BY S. F. BLAKE.

Since the publication in 1890[1] of Taubert's excellent monograph of the leguminous genus *Stylosanthes*, in which 22 species were described, only three new species have been added to the genus. In the present paper, based on a study of the material in the U. S. National Herbarium, nine new species are described, one from Florida, three from Mexico, one from the Bahamas and Cuba, and one each fron Venezuela, Ecuador, Brazil and Paraguay. The arrangement of species and nomenclature of the parts of the inflorescence follow in essentials Taubert's monograph ("prophyllum" = bractlet; "seta plumosa" = axis rudiment).

SECTION STYPOSANTHES.

Stylosanthes gloiodes, sp. nov.

Base not seen; stems suffrutescent, branched, 2 dm. long and more, densely short-hispid-pilose with ascending or spreading tuberculate-based hairs and extremely viscid; leaves mostly much shorter than the internodes, 3-foliolate; sheaths of the stipules 6 to 7 mm. long, pubescent and viscid like the stem, the teeth lance-subulate, strongly 1-nerved, 2.5 to 4 mm. long; petioles 2.5 to 4 mm. long, similarly pubescent and viscid, the rachis 1 mm. long; leaflets subsessile, elliptic, 7 to 14 mm. long, 2 to 4 mm. wide, acutish, mucronate, rounded at base, firm, entire, deep dull green, loosely and rather sparsely pilose above, tuberculate-hispidulous-ciliate on margin, beneath rather densely and loosely crisped-pilose, densely hispidulous with glandular-tuberculate-based hairs, viscid, the 3 to 5 pairs of veins whitish and prominent beneath, scarcely forming a submarginal nerve; spikes oblong, about 12-flowered, 10 to 14 mm. long, usually aggregated

[1] Verh. Bot. Ver. Brandenb. 32: 1–34. 1890.

by twos or threes at tips of branches, densely short-hispid-pilose and viscid; primary bracts unifoliolate, densely tuberculate-hispidulous and somewhat hispid-pilose, viscid, the rather broad sheaths 4 to 6.5 mm. long, the triangular cuspidate-mucronate teeth 3 to 4.5 mm. long, the petiolulate elliptic leaflet 6 mm. long or less; secondary bract 1, 4 to 4.5 mm. long, bifid, ciliate above, the lobes lanceolate, acuminate; axis rudiment absent in the upper flowers, present in the lowest as a slender awn 2 mm. long, pilose below; bractlets 2, lanceolate, acuminate, ciliate above, 3.6 to 4 mm. long; calyx 10 mm. long (including the glabrous 6.5 mm. long stipe-like base), the lowest lobe of the limb short-pointed, ciliate and pilose dorsally, the others blunt and merely ciliate; flowers, yellow; banner broadly obovate, 7 mm. long, 6 mm. wide; whole fruit 8.5 mm. long, the lower joint fertile, turbinate-obovate, compressed, 3 mm. long, 2.5 mm. wide, rather densely pilose, 1-nerved on the sides and somewhat reticulate, the upper joint oval-oblong, 4 mm. long, 3 mm. wide, evenly but not densely pilosulous, strongly 1-nerved and reticulate laterally, the incurved glabrate stoutish beak 1.5 mm. long.

Type in the U. S. National Herbarium, no. 534322, collected at Cariamanga, Ecuador, altitude 2290 meters, November 24, 1910, by C. H. T. Townsend (no. A57).

This species evidently belongs in the section Styposanthes, but deviates somewhat from the typical members of that group in the absence of the axis rudiment or "seta plumosa" in all but the lowest flower of the spike, a feature already noticed by Taubert in his *S. sympodialis* and in another member of this section. *S. gloiodes* is easily distinguished among the species of Styposanthes by its viscosity and the character of its pod.

Stylosanthes plicata, sp. nov.

Stems solitary, frutescent below, 2.7 to 4.2 dm. long, with numerous short, erect branches, glabrate below, above densely pilosulous with loose hairs, glandular-dotted, and more sparsely hispidulous with tuberculate-based ascending hairs; leaves of the branchlets crowded, 3-foliolate; sheaths of the stipules pubescent like the stem, 4 to 6 mm. long, the teeth subulate, 2 to 4 mm. long; petioles similarly pubescent, 2 to 4 mm. long, the rachis 1 mm. long; leaflets subsessile, elliptic, 5 to 8 mm. long, 1.5 to 2 mm. wide, mucronate, rounded at base, usually plicate and somewhat falcate, above sparsely spreading-pubescent, tuberculate-hispidulous-ciliate, beneath rather densely spreading-pilosulous and stipitate-glandular, more sparsely tuberculate-hispidulous, the 3 to 5 pairs of veins prominent beneath; spikes oblong or ovoid, 8 to 13 mm. long, about 10-flowered, often aggregated in twos or threes at tips of branches or in the axils; primary bracts pubescent like the stem and ciliate, unifoliolate, the sheaths 3.5 to 4.5 mm. long, the teeth 2.5 mm. long, the elliptic petiolulate blade about 4 mm. long; secondary bract 1, bifid to below the middle, ciliate, acuminate, 2.2 to 2.7 mm. long; axis rudiment slender-subulate, pilose throughout, 1 mm. long in flower, 3.5 mm. in fruit; bractlets 2, lanceolate, acute, ciliate, 2.2 mm. long; flower not seen; lower joint of pod fertile, turbinate-ob-

ovoid, compressed, 2.5 to 3 mm. long, 2.2 mm. wide, densely pilose, laterally 2 or 3-nerved but not reticulate; upper joint fertile, quadrate, 2 to 2.2 mm. long and wide, rather densely spreading-pilose, prominently 2 or 3-nerved and reticulate on the sides; beak slender, slightly incurved, pilosulous, 1 to 1.2 mm. long.

Type in the U. S. National Herbarium, no. 701387, collected in the Province of Mattogrosso, Brazil, July, 1892, by O. Kuntze.

This plant was originally identified and recorded[1] by Kuntze as *Stylosanthes leiocarpa* Vog., but it belongs to the section Styposanthes and has no relationship with that species. It seems to be most nearly related to *S. sympodialis* Taubert, known to me only from description, but differs in the nature of its pubescence, its shorter secondary bract and seta, and its persistently pubescent pod with shorter joints, the upper one with more ribs. The two specimens from which the species is described are plants of late season with the primary leaves fallen.

Stylosanthes macrocarpa, sp. nov.

Many-stemmed herbaceous perennial; stems spreading or ascending, about 15 cm. long, sparsely branched, scarcely striatulate, rather densely pilose with appressed or ascending hairs and on the upper part of the internodes spreading-hispid; leaves remote, 3-foliolate; sheaths of the stipules 3 to 4 mm. long, spreading-hispid with tuberculate-based hairs and sparsely appressed-pilose, the teeth stiff, subulate, sparsely hispid, 3 to 5 mm. long; petioles sparsely pilose and hispid, 3 to 5 mm. long, the rachis 1 to 2.5 mm. long; leaflets elliptic to obovate-elliptic, 5.5 to 13 mm. long, 1.8 to 3.5 mm. wide, mucronate, rounded at base, subsessile, entire, firm, light green both sides, sparsely hispid along costa beneath and usually along margin, obscurely ciliate, the prominent lateral veins 3 or 4 on each side; spikes subglobose or ovoid, 13 to 15 mm. long, evenly but not densely hispid with tuberculate-based yellowish hairs, 5 to 10-flowered; primary bracts hispid-pilose particularly on the sheaths, pilose-ciliate, the outermost often trifoliolate, similar to the leaves, the inner unifoliolate, the sheath 6 to 8 mm. long, the teeth 3.5 to 4 mm. long, the narrowly ovate-elliptic blade about 3.5 mm. long; secondary bract 1, oblong, 4.5 mm. long, obscurely trilobed with acuminate central lobe, sparsely pilose-ciliate; axis rudiment in flower densely pilose, 2.5 mm. long including the hairs, in fruit stiff, linear-subulate, 8 mm. long; bractlet 1, lance-oblong, pilose-ciliate, 3.5 mm. long; calyx 9 mm. long (including the 6 mm. long stipe-like base), membranaceous, ciliate, otherwise glabrous, the upper lip shortly bifid, the basal lobe longest, all obtuse; flowers evidently yellow; banner obovate-suborbicular, slightly emarginate, not clawed, 6 mm. long, 5 mm. wide; lateral petals obovate, clawed, auriculate on upper side at base of blade and with a short blunt appendage within; one of the didymous anthers twice as large as the others; fruit variable, the basal joint densely pilose, sometimes dwarfed and only 1 mm. long, usually about 2 mm. long, or

[1] Rev. Gen. 3[2]: 72. 1898.

sometimes fertile, oblong, compressed, 2-nerved and 3.5 to 5.5 mm. long, 3 mm. wide, in which case the terminal joint is dwarfed, with an ovoid body only 2 mm. long, and its seed aborted; terminal joint usually well developed, ovoid-oval, 4 to 4.5 mm. long, 3 to 3.5 mm. wide, compressed, 1-nerved and loosely prominulous-reticulate on the sides, 3-nerved on the back, evenly appressed-pilosulous like the beak, the latter stout, compressed, hooked, 3 mm. long.

Type in the U. S. National Herbarium, no. 316713, collected in moist gravelly soil of hills near Oaxaca City, Oaxaca, Mexico, altitude 1675 meters, July 3, 1897, by C. G. Pringle (no. 6721).

Stylosanthes macrocarpa is most nearly related to *S. mexicana* Taubert,[1] but may easily be distinguished by its much larger evenly pilosulous pod. The type collection was distributed as *S. humilis* H. B. K., which belongs to a different section of the genus.

S. mexicana was originally based on Schaffner's no. 579, from San Luis Potosi, and a plant collected by Ehrenberg at an unknown locality; the former of these is here selected as the type. The range of this species may be extended to include the States of Tamaulipas, where it was collected at Victoria in 1907, by E. Palmer (no. 490), and Hidalgo, where it was collected in calcareous soil near El Salto, altitude 2135 meters, June 29, 1904, by C. G. Pringle (no. 11969).

Stylosanthes tuberculata, sp. nov.

Frutescent below, branched, 3 dm. long and more; stem and branches evenly and rather densely pilose with ascending or somewhat spreading hairs, and less densely hispidulous with ascending hairs with persistent tuberculate bases; leaves mostly shorter than the internodes, 3-foliolate, often with fascicles in their axils; sheaths of the stipules 5 to 7 mm. long, pubescent and hispidulous like the stem, the teeth subulate, 2 to 3 mm. long; petioles similarly pubescent, 2.5 to 4 mm. long, the rachis about 1 mm. long; leaflets slightly petiolulate, elliptic or narrowly obovate-elliptic, 6 to 17 mm. long, 2 to 4 mm. wide, mucronulate, rounded at base, slightly denticulate nearly throughout with tuberculate-hispidulous teeth, sparsely appressed- or ascending-pilosulous and tuberculate-hispidulous on both sides, the 4 to 6 pairs of lateral veins prominulous beneath, not forming a submarginal nerve; spikes narrowly oblong, axillary and terminal, 7 to 12 mm. long, about 7-flowered; primary bracts unifoliolate, otherwise similar to the leaves, somewhat pilosulous, ciliate, densely tuberculate-hispidulous and hispid with ascending hairs, the sheath about 4 mm. long, the teeth 3.5 mm., the petiolulate elliptic blade 6 mm. or less; secondary bract 1, oblong-ovate, bifid or entire, obtusish, ciliate above, 3.3 mm. long; axis rudiment subulate, pilose, 1.2 mm. long in flower, 3 mm. in fruit; bractlets 2, linear, obtuse to acute, sparsely ciliate to glabrous, 2.6 mm. long; calyx 7.2 mm. long (including the glabrous 4.5 mm. long stipe-like base), the lobes all blunt and merely short-ciliate;

[1] Verh. Bot. Ver. Brandenb. **32**: 21. 1890.

flowers evidently yellow; banner broadly obovate, 5 mm. long, 4 mm. wide; basal joint of pod usually minute; terminal joint oblong or quadrate-oblong, 3.5 mm. long, 2.2 to 2.5 mm. wide, compressed, 1-ribbed and reticulate laterally, rather sparsely hispidulous-pilosulous; beak rather slender, erectish, slightly hooked at tip, hispidulous toward base, 1.4 to 1.7 mm. long.

Type in the U. S. National Herbarium, no. 849255, collected at Southwest Landing, New Providence, Bahama Islands, February 11, 1905, by E. G. Britton (no. 3336).

OTHER SPECIMEN EXAMINED:

CUBA: Vicinity of Pueblo Romano, Cayo Romano, Camaguey, October 8–9, 1909, *Shafer* 2463.

Stylosanthes tuberculata is nearly related to *S. hamata* (L.) Taubert, and both the collections above cited were distributed under that name. In *S. hamata*, however, the stem is pilose in lines (or all around on the uppermost internodes), without the tuberculate-based hairs of the new species, the bracts are often hispid but the hairs are not tuberculate-based, and the beak equals or usually exceeds the terminal joint of the pod.

Stylosanthes diarthra, sp. nov.

Frutescent, much branched, ascending, 3.5 dm. long or more; stem gray-barked, glabrescent; branches subterete, pilose with appressed or ascending hairs and sparsely or rather densely short-hispid; leaves about equaling the internodes, 3-foliolate; sheaths of the stipules 4 to 7 mm. long, sparsely appressed-pubescent and rather sparsely hispid-pilose with short tuberculate-based hairs, the teeth linear-subulate, sparsely hispid-pilose, 3 to 4 mm. long; petioles densely hispidulous-puberulous, 3 to 4 mm. long, the rachis 1 mm. long; leaflets elliptic or obovate-elliptic, 6 to 12 mm. long, 2 to 4.5 mm. wide, acute, mucronate, rounded at base, subsessile, subentire or usually obscurely denticulate with tuberculate-hispidulous teeth, above sparsely hispid with short hairs with persistent dark-colored tuberculate bases, beneath hispidulous especially along costa, the 3 or 4 pairs of lateral veins prominulous beneath; spikes ovoid, 8 to 12 mm. long, obscurely short-hispid, 7 to 10-flowered; primary bracts unifoliolate, pilose and ciliate, short-hispid-pilose with more or less spreading hairs with much enlarged ovoid bases, the sheath 4 to 6 mm. long, the teeth 2.5 to 3.5 mm. long, the blade 4 to 5.5 mm. long; secondary bract 1, 2-lobed for about two-fifths its length, 3.3 mm. long, the lobes acuminate, sparsely ciliate; axis rudiment linear-subulate, sparsely long-pilose, 1.5 mm. long in flower, 3.5 mm. in fruit; bractlets 2, lance-linear, acutish, sparsely ciliate at tip, 2.5 mm. long; calyx 7 to 8 mm. long (including the 5 mm. long stipe-like base), ciliate, otherwise glabrous, the lowest lobe longest and acute, the others all obtuse; banner obovate-suborbicular, scarcely clawed, 5.5 mm. long, 4.5 mm. wide; lateral petals clawed, auriculate, spurred within at base of blade; fruit usually 2-celled with both cells subequal and fertile, the lower joint quadrate-oblong, 2

to 2.5 mm. long, 2 to 2.2 mm. wide, compressed, rather densely appressed-pilosulous, with about 3 prominent veins on each side, the upper joint similar, 2.5 to 3 mm. long, 2 mm. wide, rather densely to very sparsely pilosulous, reticulate and with 1 or 2 prominent nerves on each side, the stoutish hooked pilosulous beak 0.8 to 1.5 mm. long.

Type in the U. S. National Herbarium, no. 602363, collected at Valera, State of Trujillo, Venezuela, altitude 550 meters, October 31, 1910, by Alfredo Jahn (no. 169).

Other specimens examined:

Venezuela: Páramo de los Apartaderos, Sierro de Nevada de Mérida, State of Mérida, altitude 3300 meters, December, 1910, *Jahn* 108. In savannas, Lower Cotiza, near Caracas, altitude 800 to 1200 meters, August 26, 1917, *Pittier* 7319.

This species seems to be most nearly related to *Stylosanthes scabra* Vog., known to me only from description, from which it differs in the longer teeth of the petiole-sheaths, the merely hispidulous leaflets, the much shorter heads, and the two fruiting joints and shorter beak of the pod.

Stylosanthes subsericea, sp. nov.

Frutescent and branched below, erectish, about 3 dm. high, sparsely branched above; stem gray-barked, appressed-pilose; branches densely subsericeous-pilose with appressed hairs; leaves mostly shorter than the internodes, 3-foliolate; sheaths of the stipules 5 to 9 mm. long, densely subsericeous-pilose with appressed hairs, the teeth subulate, 4 to 6 mm. long, mucronate-aristate; petioles 3 to 6 mm. long, densely silky-pilose, the rachis 1.5 mm. long; leaflets elliptic to obovate-elliptic, 10 to 19 mm. long, 3 to 6.5 mm. wide, strongly mucronate at the usually acute apex, rounded at base, entire, loosely appressed-pilose above, subglabrate, beneath and on margin loosely ascending-pilose, along costa sparsely hispid-pilose with spreading hairs, the lateral veins 4 or 5 pairs, prominent beneath, forming a submarginal nerve; spikes about 4-flowered; outer bracts trifoliolate, similar to the leaves, the inner unifoliolate; secondary bract 1, lance-ovate, acuminate, entire, pilose-ciliate nearly to base, 6 to 7.5 mm. long; axis rudiment subulate, pilose except toward apex, in flower about 2 mm. long; bractlet 1, similar to the secondary bract, 3.5 mm. long; calyx 11.5 mm. long (including the 6.5 mm. long stipe-like base), the upper lip densely long-pilose-ciliate and somewhat pilose dorsally, with two rounded lobes, the lateral lobes shorter than the upper lip, ciliate and sparsely pilose dorsally, rounded, the lowest lobe the longest, acute, pilose-ciliate and dorsally pilose; banner suborbicular-obovate, 6.5 mm. long, 5.5 mm. wide, not clawed; lateral petals obovate, auriculate at base of blade and shortly appendaged within; keel petals similar; fruit unknown.

Type in the U. S. National Herbarium, no. 567473, collected on the Cerro de Picacho, Oaxaca, Mexico, July, 1914, by C. A. Purpus (no. 7152).

The type number of this species was distributed as *Stylosanthes viscosa* Swartz. *S. subsericea* belongs to the section Styposanthes, however, and in no way suggests *S. viscosa*. It is distinguished among the species of its section by its dense subsericeous pubescence and its strongly mucronate leaflets. The fruit when known will doubtless furnish additional characters.

Section Eustylosanthes.

Stylosanthes floridana, sp. nov.

Stems few, herbaceous, apparently erect, 0.8 to 2.5 dm. high, slender, striate, rather densely but inconspicuously pubescent with appressed or ascending hairs; leaves rather few, shorter than the internodes, 3-foliolate; sheaths of the stipules 3 to 5 mm. long, appressed-pubescent chiefly near the margin, the stiff linear-subulate 1-nerved teeth 3 to 4 mm. long; petioles appressed-pubescent, 1.5 to 3 mm. long, the rachis 1 to 1.5 mm. long; leaflets subsessile, linear-elliptic, 9 to 15 mm. long, 1.3 to 2.5 mm. wide, cuspidate-mucronate, rounded at base, entire, firm, puberulous along costa above, slightly pubescent at base beneath, the 3 to 5 pairs of veins prominent beneath, the lowest pair elongated to form a submarginal nerve; spikes subglobose, 6 to 10 mm. long, about 8-flowered, not hispid; primary bracts unifoliolate, the sheaths 3 to 4 mm. long, pilose-ciliate and somewhat pilose on back, the teeth subulate from an ovate 3-nerved base, 2.5 to 3 mm. long, the blade linear-elliptic, 4 to 10 mm. long, rarely with a few hispid-pilose hairs; secondary bracts 2, lanceolate, 2.5 to 3.5 mm. long, entire, acuminate, free, paleaceous-scarious, densely pilose chiefly inside and on margin above the base with long, flexuous hairs; axis rudiment none; bractlet similar to the secondary bracts, 1 to 2 mm. long, at maturity usually united laterally nearly to apex with one of the secondary bracts; stipe-like base of calyx 2.5 mm. long, the calyx limb 3.5 long, 5-lobed, the lobes densely ciliate and more or less pilose dorsally with crisped hairs, the 2 upper lobes obtuse, the lateral acute, the lowest longest; corolla evidently yellow; blade of banner suborbicular, rounded, 4 mm. long and wide, the claw about 1 mm. long; lateral petals obovate, 4.5 mm. long, clawed, retrorsely auriculate-spurred on upper side at base of blade and with an internal blunt spur of the same length; keel emarginulate, somewhat denticulate at tip, the petals free only at base, the blades broadly auriculate at base, obtusely saccate-spurred at base within; stamens with didymous anthers equaling the style, the others somewhat shorter; basal joint of pod very small, densely pilose; fruiting joint ovoid to oblong-ovoid, rather plump but somewhat compressed, like the beak densely pilosulous with crisped hairs, strongly 3-ribbed on the sides and favose-reticulate, the body 3.5 to 4 mm. long, 2.5 to 2.8 mm. wide, the stoutish incurved-hooked beak 0.5 to 0.8 mm. long.

Type in the U. S. National Herbarium, no. 859518, collected at De Funiak Springs, Walton County, Florida, July 3, 1891, by G. B. Sudworth.

ADDITIONAL SPECIMENS EXAMINED:

FLORIDA: Dry pine barrens near Jacksonville, June 17, 1898, *Curtiss* 6418 (in part).

Stylosanthes floridana is closely related to *S. biflora* (L.) B. S. P. It may be distinguished by the lack of hispidity on the heads and the stem. The fruit, also, is much more strongly nerved and reticulate than is often the case in *S. biflora*.

Stylosanthes macrosoma, sp. nov.

Suffrutescent below, the branches erect, with erect branchlets, 1.8 dm. high, rather sparsely spreading-hispid-pilose with pale scarcely tuberculate-based hairs, and in youth somewhat appressed-pubescent; leaves shorter than the internodes, 3-foliolate; sheaths of the stipules 5 mm. long, like the teeth rather sparsely spreading-hispid-pilose, the teeth slender-subulate, stiff, 2.5 to 4 mm. long; petioles sparsely spreading-hispid-pilose, somewhat puberulous above, 3 to 6 mm. long, the rachis about 1 mm. long; leaflets slightly petiolulate, linear-elliptic, 8 to 14 mm. long, 1 to 2 mm. wide, acute, mucronate, rounded at base, firm, green both sides, rather sparsely spreading-hispid-pilose on costa and margin, the veins whitish, 3 or 4 pairs, prominent beneath, forming a submarginal nerve; spikes oblong to ovoid, 6 to 10 mm. long, not densely hispid-pilose, about 7-flowered; primary bracts unifoliolate, otherwise similar to the leaves, ciliate and sparsely spreading-hispid-pilose, the sheath 4 mm. long, the teeth 2.5 mm. long, the linear-elliptic petiolulate blade 4.5 mm. long or less; secondary bracts 2, linear-lanceolate, acutish, ciliate, 3 to 3.5 mm. long; axis rudiment none; bractlet 1, linear, obtusish, ciliate, 1.2 to 2.5 mm. long; calyx 5 mm. long (including the glabrous 3 mm. long stipe-like base), the lobes all obtuse, ciliate, otherwise glabrous; banner obovate, 4.5 mm. long, 2.5 mm. wide; lower joint of pod sterile, narrowly oblong, densely pilosulous, 1.5 mm. long; upper joint at full maturity oblong, 4.8 mm. long, 2.2 mm. wide, strongly compressed, glabrous, very weakly 2-veined on the sides, whitish, the strongly incurved hispidulous beak 2.2 mm. long.

Type in the U. S. National Herbarium, no. 1012417, collected in central Paraguay, 1888 to 1890, by T. Morong (no. 255).

This strongly marked new species was distributed as *S. guyanensis* (Aubl.) Swartz. It is distinguished from that and all other species of its section (Eustylosanthes) by the characters of its fruit.

Stylosanthes purpurata, sp. nov.

Base not seen; stem frutescent below, branched, 3.5 dm. long and more, fuscous-purplish, rather densely ascending-pilose (the hairs denser in lines decurrent from the leaf-bases) and pilose-setose with slender spreadins tuberculate-based at length deciduous dark hairs; leaves (except on the branchlets) much shorter than the internodes, 3-foliolate; sheaths of the stipules 3 to 6 mm. long, purplish, pubescent like the stem, the teeth subulate, setose-tipped and setose-ciliate, 3 to 4.5 mm. long; petioles pil-

ose, scarcely setose, 2 mm. long, the rachis 1 to 2 mm. long; leaflets obscurely petiolulate, lance-elliptic to elliptic, or the upper linear-elliptic, 8 to 17 mm. long, 1.5 to 4 mm. wide, acute to acuminate, mucronate, at base rounded, above purplish-tinged, rather densely spreading-pilose especially along the midvein, along margin pilose-setose throughout with spreading hairs with slightly enlarged purplish bases, beneath green, rather densely pilose with ascending or subspreading hairs, along costa sparsely pilose-setose, the lateral veins 4 or 5 pairs, prominulous beneath, scarcely forming a marginal nerve; spikes axillary and terminal, oblong or subglobose-oblong, 7 to 10 mm. long, densely pilose-setose, about 7-flowered; primary bracts unifoliolate, the sheaths purple, 3 to 4 mm. long, sparsely pilose, ciliate, and with the teeth (2 to 2.5 mm. long) and the sessile leaflet (3 to 5 mm. long, narrowly elliptic) pilose-setose with spreading purplish hairs; secondary bract 1, oblong-ovate, 2.7 mm. long, acuminate, purple at tip, pilose-ciliate and densely pilose within above the middle; axis rudiment none; bractlet 1, precisely similar in every way to the secondary bract, or sometimes a little narrower and shorter; calyx 8 mm. long (including the 4.5 mm. long stipe-like base), the limb ciliate, the upper lobes longer than the lateral, rounded, the lowest lobe longest, ciliate and sparsely pilose, acutish; banner broadly obovate, 5.8 mm. long, 3.5 mm. wide; lateral petals clawed, auriculate-spurred and appendaged within; stamens with didymous anthers equaling the style, considerably longer than the others; lower joint of fruit infertile, turbinate, densely pilosulous, 0.8 mm. long; upper joint oblong-ovoid, plump, 2.5 to 3 mm. long, 1.9 to 2.2 mm. wide, 1-nerved and loosely reticulate on the sides, sparsely dotted with sessile glands, otherwise glabrous, the weak strongly inflexed beak about 0.2 mm. high.

Type in the U. S. National Herbarium, no. 301895, collected at Bolaños, Jalisco, Mexico, September 10–19, 1897, by J. N. Rose (no. 2942).

This species is closely similar in general appearance and in pubescence to *Stylosanthes dissitiflora* Robinson & Seaton. In that species, however, now represented in the U. S. National Herbarium by five collections, including the type, from the vicinity of Guadalajara and Etzatlan, Jalisco, the leaves are nearly glabrous except for the stiff hairs of the margin and veins, the flowers are few and scattered in the spike, the bractlets are two, and the fruit is papillose-puberulous and usually two-nerved on the sides.

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PROCEEDINGS
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FOUR NEW BIRDS FROM THE PHILIPPINES AND GREATER SUNDA ISLANDS.[1]

BY J. H. RILEY.

The following four apparently unnamed forms have been discovered in a further study of the collection made in Celebes by Mr. H. C. Raven[2] and are herewith described.

Anthreptes malacensis paraguæ, subsp.. nov.

Type, adult male, U. S. National Museum, No. 233332, Puerto Princesa, Palawan, Philippines, December 14, 1891. Collected by D. C. Worcester and F. S. Bourns (original No. 3274).

Similar to *Anthreptes cagayanensis* Mearns, but the metallic violet reflections more uniform and deeper on the crown and upper back and the breast a clearer yellow. Wing, 67; tail, 45; culmen, 17 mm.

Remarks.—This race is founded upon a good series of both sexes. All the males agree in having the crown, hind-neck, and upper back deep metallic violet and only show dark green reflections to any extent when held with the bill towards the light. *Anthreptes malacensis wiglesworthi* has the crown and upper back a deep, bright, shining coppery green; in *Anthreptes malacensis cagayanensis* these parts have a metallic violet wash in addition to the green; while in *Anthreptes malacensis paraguæ* the metallic violet wash is intensified and the metallic green has almost entirely disappeared.

Females of *Anthreptes malacensis paraguæ* are similar to the same sex of *Anthreptes malacensis cagayanensis* but the yellow below is slightly purer, not quite so greenish.

Anthreptes malacensis bornensis, subsp. nov.

Type, adult male, U. S. National Museum, No. 211591, Po Bui Island, Sandakan, British North Borneo, March 1, 1908. Collected by Paul Bartsch.

[1] Published by permission of the Secretary of the Smithsonian Institution.

[2] Cf. Proc. Biol Soc. Wash., 31, 1918, pp. 155–160; and 32, 1919, pp. 93–96.

Similar to *Anthreptes malacensis, malacensis* but the breast deeper yellow, the brown of the throat redder; the cheeks strongly washed with the color of the throat; and the middle and greater wing-coverts washed with a deeper and more reddish brown. Wing, 66.5; tail, 46; culmen, 18 mm.

Remarks.—This race is founded upon a good series from the type locality and the U. S. National Museum contains a large series from northern Dutch East Borneo, and a male from Labuan that seems to belong to the same form. A specimen from Pulo Laut, Southeast Borneo, seems to belong to the Javan race. Malay Peninsula specimens have the cheeks olive-green, sometimes with a slight reddish cast, but nothing like the deep wash in the North Bornean specimens. In the color of the throat, cheeks, and middle wing-coverts *Anthreptes malacensis bornensis* approaches *Anthreptes rhodolaema*, but it cannot be a race of that species as there are specimens of both species in th U. S. National Museum from the same locality at sea-level in northern Dutch East Borneo.

Females of *Anthreptes malacensis bornensis* differ from the same sex of *Anthreptes malacensis malacensis* in being much deeper and brighter yellow below.

Enodes erythrophrys centralis, subsp. nov.

Type, adult male, U. S. National Museum, No. 250862, Goenoeng Lehio, Celebes, January 13, 1917. Collected by H. C. Raven (original No. 3392).

Similar to *Enodes erythrophrys erythrophrys*, but superciliaries orange chrome not flame scarlet; rump and crissum lighter yellow; outer margins of wing feathers and upper surface of tail more greenish; and wing and tail shorter. Wing, 109; tail, 106.5; culmen, 19; tarsus, 26.5; middle toe, 21.5 mm.

Remarks.—In addition to the type the present race is founded upon a male from Winatoe, a male and two females from the Lindoe Trail, three males and two females from Besoa, and a male from Rano Rano. For comparison the collection contains a good series of northern birds. All the specimens from the north have the peculiar superciliary feathers flame scarlet while the form from the north central part of the island has these feathers orange chrome; this is the most striking difference and seems to be constant, the other characters, except size, are only average and inconstant.

The two series average as follows:

	Wing.	*Tail.*	*Culmen.*
Seven males, north Celebes.....	115	113.2	17.8
Six males, north-central Celebes.....	111.2	104.6	18
Eight females, north Celebes.....	107.2	104.1	17.7
Four females, north-central Celebes...	104.6	98.3	16.6

Munia punctulata particeps, subsp. nov.

Type, adult male, U. S. National Museum, No. 251332, Rano Lindoe, Celebes, March 15, 1917. Collected by H. C. Raven (original No. 3920).

Similar to *Munia punctulata cabanisi* of the Philippines, but darker above, the closed wing outwardly deeper more rusty brown, the throat and cheeks deeper brown, especially on sides of face and lores, the barring on the breast and flanks much coarser and darker brown. Wing, 50.5; tail, 40; culmen, 11 mm.

Remarks.—The above race is founded upon four adult males from the type locality, two adult females from Napoe, and one adult female from Besoa; in addition there are several immature specimens from the type locality and Gimpoe that have not been taken into consideration. This is the bird described as *Munia punctulata nisoria* by Meyer and Wiglesworth,[1] but they could hardly have compared specimens from Celebes with those from Java, or they certainly would have seen how different they are. The Javan bird has the rump barred with white and the tail gray above, while the Celebes form has the rump unbarred and the tail buffy citrine; the latter race is also darker above and on the throat, with the white of the belly more restricted; and is smaller.

Walden[2] had noticed the difference between the color of the tails of the Java race and that of the only specimen he had from Celebes. Stresemann[3] has indicated the Celebes bird as probably a distinct form but did not name it, probably because his series was inadequate. As a matter of fact in size and in the color of the back and tail, the Celebes bird approaches the Philippine form, but in the coarser markings of the breast and flanks it more closely resembles Javan specimens. It is perfectly distinct from either and well merits recognition. I have been unable to compare it with *Munia punctulata blasii* Stresemann, not having specimens, but it is undoubtedly different, judging from his description and remarks.

[1] Birds of Celebes, 2, 1898, 548.
[2] Tr. Zool. Soc., Lond., 8, 1872, 73.
[3] Nov. Zool. 19, 1912, 317.

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PROCEEDINGS

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A CONTRIBUTION TO THE ICHTHYOLOGY OF BERMUDA.

BY JOHN TREADWELL NICHOLS.

The American Museum of Natural History has recently received a collection of Bermuda fishes taken personally by Mr. Louis L. Mowbray over a period of several years. Mr. Mowbray is so thoroughly familiar with the piscifauna of that locality that he is especially well qualified to judge what material from there will prove of interest; and it follows that this collection supplements, to a considerable extent, what is known of Bermuda fishes. It contains seven species which appear to be undescribed, as follows:

Family Muraenidae.

Gymnothorax brunneus, sp. nov.

Close to *Gymnothorax* (*Lycodontis*) *funebris*, but with different dentition, less deep, dorsal origin further back, eye apparently smaller in specimens of same length. The type, our only specimen, No. 7309, American Museum of Natural History, was collected at Bermuda by Mr. Louis L. Mowbray. It is 344 mm. in total length. Head 2.8 in trunk, tail 0.7, depth 6.9. Gape 2.1 in head, snout 5.5. Eye 1.8 in snout, equal to interorbital.

Jaws curved, not quite closing. Long, depressible, simple canines in jaws, and two or three (the longest) in a single row on vomer. An outer row of smaller sharp, more or less unequal, retrorse teeth in jaws. Dorsal beginning over front of gill opening. Fins rather low.

Color uniform dark chestnut brown, including fins which are unmarked. Back and dorsal especially, of this specimen, thickly dotted with small pale encrustations.

Family Serranidae.

Anthias tenuis, sp. nov.

More slender with a greater number of scales than *Anthias louisi* T. H. Bean, also described from Bermuda. The type, No. 7310, American Museum of Natural History, was collected at Bermuda, by Mr. Louis L. Mowbray, on December 17. It is 68 mm. long to base of caudal. Head 3.6 in this length, depth 3.4. Snout 4.7 in head, eye 3.3, maxillary 2.0, interorbital 3.6, longest dorsal spine, 2.2, dorsal ray 2.7, anal spine 3.5, anal ray 2.8, pectoral 1.2, ventral 1.3, caudal 1.9, depth of peduncle 2.2.

Lower jaw projecting, maxillary to beyond center of eye, interorbital slightly convex. Center of upper jaw notched, its teeth small, in more than one row anteriorly. Those in the lower jaw in a single row, with canines, preopercle serrulate, two weak, flat spines at its angle, the upper the longer. Opercle with two weak, flat spines at its angle, the lower the longer. Snout naked, scales extending forward to above center of eye, maxillary scaled. Lateral line with a downward angle under the axil of the soft dorsal. Lateral line about 54. About 5 scales between lateral line and origin spinous dorsal, 3 between lateral line and middle of same. Dorsal spines weak and fragile. Caudal forked, the lobes bluntly rounded. Dorsal X, 15. Anal III, 9.

Color in spirits uniform pale brownish, likely rosy in life.

Besides the type there is a specimen 50 mm. to base of caudal from Bermuda.

Family Pomacentridae.

Chromis bermudae, sp. nov.

Allied to *C. enchrysurus*, from which it differs in technical details. The type, No. 7317, American Museum of Natural History, was collected at Bermuda by Mr. Louis L. Mowbray. It is 60 mm. long to base of caudal. Head 3.1 in this length, depth 2.5 Snout 4.0 in head, eye 2.7, maxillary 3.5, interorbital 3.0, pectoral 1.0, ventral 1.2 with filamentous tip, longest dorsal spine 2.0, dorsal ray 1.7, second anal spine 1.7, longest anal ray 1.7, caudal 1.2, caudal peduncle 2.0, its depth slightly greater than its length.

Interorbital broad, almost flat. Outer ventral rays excerted. Lobe of soft dorsal to or beyond caudal base. Caudal shallowly forked, the lobes blunt. Lateral line 27. Dorsal XIV, 11. Anal II, 11.

Color in spirits; purplish above, paler below; axil of pectoral black. Paired fins, peduncle and caudal yellowish.

Three other small specimens with the same data are in a poor state of preservation as though taken from the stomach of some larger fish.

Family Labridae.

Small wrasses are particularly numerous and variable about Bermuda and it is somewhat of a problem to classify them properly. To do so would probably entail a thorough revision of the group. The characters which separate the different species are slight and often variable. For

instance, in some cases color is the most tangible criterion; even though color changes of each form may be more striking than the color differences between them. It is not improbable that species already recognized will eventually be relegated to synonomy, but the following appear to be distinct from any so far described:

Iridio frenatus, sp. nov.

A black axillary spot, blotch below the center of side, and on spinous dorsal. Lips pale, a conspicuous pale streak from the corner of the mouth to the base of the pectoral. The type, our only specimen, No. 7313, American Museum of Natural History, was collected in Bermuda by Mr. Louis L. Mowbray. It is 89 mm. long to base of caudal. Head 3.4 in this length, depth 3.6. Snout 3.3 in head, eye 6.0, interorbital 4.8, pectorals and ventrals broken, longest dorsal spine 3.0, dorsal ray 2.6, anal spine 6.0, anal ray 3.3, caudal 1.7.

Head and body moderately compressed. Canines in front of jaws $^2/_2$, the upper short, lips very full. Lateral line 26. A rather broad naked strip cephalad from the dorsal. Caudal slightly rounded. Dorsal IX, 11. Anal III, 11.

Color in spirits, purplish grey, fading on the lower parts. Front of dorsal purplish grey, becoming pale posteriorly. A black blotch between the 5th and 8th spines, a pale stripe bordering this above, extends backward in the center of the fin, purplish grey against a paler ground. A black blotch below the center of the side and spot in the upper axil of the pectoral. Lips pale, and a conspicuous pale stripe from corner of mouth to base of pectoral.

Iridio similis, sp. nov.

With small scales before the dorsal as in *I. semicinctus* of the Pacific and the lateral band bolder and blacker than in many similar appearing species. The type, our only specimen, No. 7312, American Museum of Natural History, was collected in Bermuda by Mr. Louis L. Mowbray. It is 90 mm. long to base of caudal. Head 3.1 in this length, depth 3.6. Snout 3.0 in head, eye 5.0, interorbital 5.0, maxillary 4.6, pectoral 1.5, ventral 1.6, longest dorsal spine 3.2, dorsal ray the same, longest anal spine 3.8, anal ray 3.2, caudal 1.6.

Head and body compressed. Outer ventral rays excerted. Canines in front of jaws well developed $^2/_2$, the upper curved outward. Lateral line 26. About 8 rows of scales before the dorsal, the anterior reduced in size and some of them crossing the center of the back. Caudal subtruncate, its angles slightly rounded. Dorsal IX, 11. Anal II, 11.

Color in spirits pale, a broad, black band from snout onto center of caudal. A black spot in the axil of the pectoral. An elongate black blotch on the spinous dorsal and dusky lengthwise streak in the center of the dorsal behind same. Fins otherwise pale.

Bermudichthys, gen. nov.

Type, *Bermudichthys subfurcatus*, sp. nov.

A labrid fish close to *Thalassoma*. Dorsal spines 7, anal 2. Teeth irregularly larger at front of jaws, 1 or 2 in the front of the upper jaw only might be considered poorly developed canines. Head without scales, little compressed, caudal moderately forked, the lobes not produced. The weak teeth and few spines of our two specimens may be matters of individual abnormality, in which case this fish should stand as a sub-genus under *Thalassoma*. Bermuda is a center of abundance and diversity for the wrasses, and it is appropriate that one of them should bear its name.

Bermudichthys subfurcatus, sp. nov.

The distinctly forked caudal without excerted lobes separates this species from numerous small wrasses with which it is associated. The type, No. 7314, American Museum of Natural History, was collected at Bermuda by Mr. Louis L. Mowbray. It is 86 mm. long to base of caudal. Head 3.0 in this length, depth 4.0. Width of head 2.5 in its length, snout 3.4, eye 5.0, interorbital 3.7, maxillary 4.6, pectoral 1.4, ventral 2.6, longest dorsal spine 3.3, dorsal ray 2.6, longest anal spine 3.2, anal ray 2.6. Caudal 1.5.

Head little compressed, without scales. Ventrals short and blunt. Teeth in front of jaws increased in size, scarcely canines. Lateral line complete, 27. Caudal evenly forked for about $^1/_3$ its length; upper lobe slightly the longer. Dorsal VII, 13. Anal II, 11.

Color in spirits, dark above including dorsal, blotched on the sides, pale below. Pectoral pale, darkened terminally, ventral and anal more or less dark. Caudal mostly dark, the center of the lower lobe pale.

A co-type with the same data 62 mm. to base of caudal, has the entire center of caudal pale, the fork about $^1/_4$ its length.

Family Antennariidae.

Histrio jagua, sp. nov.

Resembles the common *Histrio* (*Pterophryne*) *histrio* but is very different in color, with pale markings on a dark ground. The type, our only specimen, No. 7316, American Museum of Natural History, was collected at Bermuda by Mr. Louis L. Mowbray. It is a large specimen, 110 mm. to base of caudal. Head 2.6 in this length, depth 2.0. First dorsal spine with bait 4 in head, 2nd dorsal spine 2.3, 3rd 1.4, longest dorsal ray 1.4, anal ray 1.4, pectoral from arm-pit 1.0, ventral 1.5, snout 4.5, eye 1.5 in snout.

The bait on first dorsal spine is entire, somewhat pointed, with pappillae. Dorsal rays 12. Anal 7.

In spirits the dorsals are dark chocolate-brown with white bars and spots. Head, back and sides are uniform chocolate-brown with two rather regular whitish rings posteriorly, each surrounding a whitish central spot; also with other whitish markings. Anal and caudal are whitish

irregularly barred and reticulated with chocolate-brown. Lower surface from chin to vent paler than rest of body.

A very satisfactory revision of Bermuda fishes by T. H. Bean may be found in Field Columbian Museum, Zoölogical Series, Vol. 7, 1906, pp. 21–89, and Proc. Biol. Soc., Wash., Vol. 25, 1912, pp. 121–126. *Stolephorus viridis*, described p. 122 of the latter publication, is obviously from the description not an anchovy but a herring. A series of about 40 individuals so labeled in the present collection are identified as *Jenkinsia stolifera*, of which *viridis* may be considered as a synonym and which should replace it in the Bermuda list.

The following species are additions to this list: *Gymnothorax* (*Lycodontis*) *miliaris*, *Tylosurus notatus*, *Halocypselus evolans*, *Syngnathus louisianae*, *Prionodes tigrinus*, *Eleotris pisonis*, *Gobius translucens*.

Gobius translucens is a species recently described from Porto Rico. It is close to *G. glaucofraenum*, but apparently distinct. Earlier Bermuda records for *glaucofraenum* may refer to it. The identification of certain pipe-fishes is difficult and fraught with the possibility of error. In the case of *Syngnathus louisianae*, a large specimen which has been compared with a series from the coast of the United States in the American Museum of Natural History, there is no doubt. There are several specimens of *Syngnathus pelagicus* in the collection which can not be distinguished from material from floating weed in the east-central North Atlantic with which they have been compared.

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PROCEEDINGS
OF THE
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SIX NEW SPECIES OF PLANTS FROM MEXICO.[1]

BY PAUL C. STANDLEY.

During the preparation of an account of the woody plants of Mexico, the first portion of which is now being printed in the Contributions from the National Herbarium, a few plants have been found which can not be referred to any of the published species. Six of these are here described as new. Four of them (*Podopterus*, *Ruprechtia*, *Coccoloba*) belong to the family Polygonaceae, one to the Aristolochiaceae, and one (*Fendlerella*) to the Hydrangeaceae.

Aristolochia malacophylla Standl., sp. nov.

Stems subterete, densely pilose with retrorse, sericeous, whitish or fulvous hairs, the internodes 6.5–10.5 cm. long; petioles very stout, 1 cm. long or shorter, densely pilose; leaf blades oval or elliptic-oval, about 12.5 cm. long and 7–8 cm. wide, cordate at the base, obtuse or rounded at the apex, subcoriaceous, densely pilose on the upper surface with slender soft appressed hairs, the venation prominulous, beneath loosely sordid-tomentose, the lateral veins 7 on each side, arcuate; inflorescence axillary, racemose, few-flowered, the flowers nearly sessile; ovary densely sericeous; calyx short-pilose outside, the tube inflated, 1 cm. long, the limb inflated at the base into a sac 2 cm. long and 1 cm. thick, the lip about 5 cm. long, glabrous within, cleft into 3 linear lobes.

Type in the U. S. National Herbarium, No. 462360, collected at Salto de Zaráracua, Uruapam, Michoacán, Mexico, October 10, 1904, by C. G. Pringle (No. 13424).

A relative, apparently, of *A. tricaudata* Duchartre, but in that the leaves are glabrous on the upper surface and rounded at the base, and the flowers are much larger, with a more deeply cleft calyx limb.

[1] Published by permission of the Secretary of the Smithsonian Institution.

Podopterus cordifolius Rose & Standl., sp. nov.

Small tree with straggling pendent branches, the branchlets obscurely puberulent or glabrous; petioles slender, about 4 mm. long, minutely pilose; leaf blades oval-ovate, about 2.5 cm. long and 1.4 cm. wide, cordate or subcordate at the base, obtuse or acutish at the apex, bright green, slightly paler beneath, glabrous; racemes lateral, 2.5–3 cm. long, the flowers slender-pedicellate, glabrous; calyx about 1 cm. long, the wings of the segments 2–2.5 mm. wide, very thin, entire or somewhat undulate, long-decurrent upon the pedicel.

Type in the U. S. National Herbarium, No. 238935, collected along the seashore at Manzanillo, Colima, Mexico, June 25, 1892, by M. E. Jones (No. 103).

Only two other species of the genus are known. The present one is most nearly related to *P. mexicanus* Humb. & Bonpl., but in that the leaves are broadly obovate and acute or acuminate at the base. *P. emarginatus* Gross, described from Yucatán, is a very different plant with large orbicular leaves, and may not be correctly referred to *Podopterus*.

Ruprechtia occidentalis Standl., sp. nov.

Shrub, about 3 meters high, with slender grayish branches, the branchlets strigillose at first; ocreae 2 mm. long; petioles 2–5 mm. long; leaf blades narrowly elliptic-oblong, lanceolate, or oblanceolate, 3–8 cm. long, 1–2.5 cm. wide, obtuse to attenuate at the base, acutish to acuminate at the apex, chartaceous or subcoriaceous, green and glabrous on the upper surface, the costa prominent but the other venation inconspicuous, slightly paler beneath, sparsely short-pilose or glabrate, the venation very prominent and closely reticulate; staminate spikes slender, paniculate, the flowers glabrous; pistillate racemes lateral, solitary or fasciculate, the rachis 1–2.5 cm. long, the pedicels slender, 2–3 mm. long, short-pilose, articulate near the apex; calyx in fruit 1.5–2.2 cm. long, short-pilose below, glabrous above; inner calyx lobes linear, 4 mm. long, appressed-pilose outside; achene ovoid, 8 mm. long, acuminate, thinly appressed-pilose, deeply sulcate, the apex acutely triquetrous.

Type in the U. S. National Herbarium, No. 636452, collected on a dry hillside at San Blas, Sinaloa, Mexico, March 29, 1910, by J. N. Rose, P. C. Standley, and P. G. Russell (No. 13630). The following additional specimens belong here:

Sinaloa: Culiacán, 1891, *Palmer* 1782, 1780. Ymala, 1891, *Palmer* 1710.

Closely related to *C. fusca* Fernald, and perhaps only a variant of that species. *C. fusca*, however, has broader, densely short-pilose leaves, pubescent staminate flowers, and usually a larger fruiting calyx.

Coccoloba acapulcensis Standl., sp. nov.

Glabrous throughout, the branches dark reddish brown; ocreae 8–12 mm. long; leaves mostly peltate, the petioles slender, 2.5–3 cm. long, attached to the blade 8–14 mm. from the base, the blades orbicular or nearly so, 5.5–8 cm. wide, rounded at both ends or sometimes emarginate at the base, subcoriaceous, slightly paler beneath, the venation prominu-

lous on the upper surface and prominent on the lower; fruit obovoid, about 2.5 cm. long and 1.5 cm. in diameter.

Type in the U. S. National Herbarium, No. 567933, collected in the vicinity of Acapulco, Guerrero, Mexico, October, 1894–March, 1895, by Edward Palmer (No. 399).

A very well-marked species, distinguished from all other North American ones by its peltate leaves. At least two South American species have peltate leaves, but they differ from the Mexican plant in other particulars. One leaf of the type specimens of the new species is not peltate but is deeply cordate at the base. The Mexican plant is a member of the subgenus *Eucoccoloba*.

Coccoloba chiapensis Standl., sp. nov.

Large tree; branchlets grayish, ferrugino-hirtellous when young; ocreae 5–7 mm. long, rufous-strigose; leaves subsessile, the petioles 4 mm. long or shorter, the blades elliptic, 12.5–20 cm. long, 4.3–8.5 cm. wide, cuneately narrowed to the obtuse asymmetric base, acuminate or long-acuminate at the apex, bright green, glabrous, the venation prominent or prominulous on both surfaces; inflorescence about 25 cm. long, nearly sessile, the rachis minutely puberulent, the nodes mostly 2-flowered; pedicels fully twice as long as the ocreolae; perianth tube 1.2 mm. long, the lobes nearly 2 mm. long.

Type in the U. S. National Herbarium, No. 884557, collected at Finca Irlanda, Chiapas, Mexico, June, 1914, by C. A. Purpus (No. 7699). There is another specimen of the same species in the National Herbarium (No. 884556), collected in Chiapas, without locality or date, by Purpus, and numbered 7599. It matches the type exactly, and may be of the same collection.

The leaves are very different from those of any of the described Mexican species.

Fendlerella lasiopetala Standl., sp. nov.

Low erect shrub, the stout branches covered with exfoliating bark; leaf blades elliptic, oval-elliptic, or ovate-elliptic, 10–18 mm. long, 5–8 mm. wide, acute or obtuse, densely strigose on the upper surface, beneath densely white-tomentose and copiously pilose, the margins plane or revolute; cymes about 1 cm. broad, dense; hypanthium and calyx densely strigose, the sepals lance-oblong; petals undulate, copiously sericeous-pilose outside; filaments subulate.

Type in the U. S. National Herbarium, No. 570036, collected in San Lorenzo Canyon, southeast of Saltillo, Coahuila, Mexico, April 16, 1905, by Edward Palmer (No. 535).

The other species of the genus differ in having glabrous petals. Only one species, *F. mexicana* Brandeg., has been reported previously from Mexico. That plant, which is known only from Puebla, resembles *F. lasiopetala* in the white tomentum of the leaves, but it has very sparse pubescence upon the calyx. *Fendlerella utahensis* (S. Wats.) Heller, the type of the genus, has been collected in the mountains of Chihuahua and Coahuila.

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PROCEEDINGS

OF THE

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A NEW SHIPWORM.[1]

BY PAUL BARTSCH.

The United States National Museum has received several sendings of shipworms from Mr. A. Reyne, of the Agricultural Experiment Station, at Paramaribo, Dutch Guiana, which prove to belong to an undescribed species. These mollusks, Mr. Reyne states, destroy sluices built of greenheart wood (*Nectandra rodiaei* Schomburgk) in a very short time. This wood was believed to be immune to shipworm attacks, and since I understand large quantities of greenheart timber are used at the Canal Zone, which is not distant from Dutch Guiana, it should prove of especial interest to us. The new mollusk is so distinct from any of the known species of *Teredo* that I shall assign it to a new subgenus which may be known as:

Neoteredo, new subgenus.

The characters which differentiate this subgenus from typical *Teredo* are the sudden downward bending of the posterior edge of the median portion of the shell, the very short posterior auricle which extends inward to form a broad shelf for muscular attachment and a very short broad blade which is far more posteriorly directed and has the flat side almost at right angles in position, to that of typical *Teredo.* I take pleasure in naming the type of the subgenus for its discoverer. It may be known as:

Teredo (Neoteredo) reynei, new species.

Shell subglobular; exterior cream-yellow excepting the central portion of the median part, which is dark brown gradually shading to light brown posteriorly; interior bluish white.

Exterior:

The anterior portion consists of an outer roughly grooved area at the

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extreme anterior edge, followed by the main anterior portion which bears dental ridges and is about two and a half times as broad as the part just mentioned. The dental ridges are of quite regular width and spacing; they curve upward at their anterior limit, then extend in an even curve across the shell to meet the anterior end of the dental ridges of the median portion. In the type, 125 of these dental ridges are present. These ridges are about as wide as the grooves that separate them. They are triangular with the dorsal slope a little more abrupt than the vertical, the edge being finely serrated. The depressions between the denticles pass down on both sides of the dental ridge as fine incised lines. There are about six denticles present on the ridge in a distance equal to that separating ridge from ridge. The dental ridges of the anterior and median part meet almost at right angles. The denticles on the median part are slightly stronger than those on the anterior ridges. The dental ridges of the median portion terminate rather abruptly without change of curve at the junction of the anterior median with the posterior median portion. The posterior median portion is marked by coarse transverse wrinkles on its anterior third, from which lesser lines of growth take a sudden upward curve and extend partly over the rest of the shell. The posterior median portion is suddenly deflected inward, giving this portion of the shell a truncated appearance at the posterior margin. This part is finely granulose above the median portion of the posterior auricular part, while ventrally it is faintly longitudinally grooved. The posterior portion of the shell is produced into a short auricle, which is marked by the continuation of the feeble grooves extending over it from the posterior portion of the median part.

Interior:

The umbonal knob has a strong, narrow, blade-like tooth extending obliquely into the cavity. A strong oblique shelf for muscular attachment extends from the umbonal tooth to the ventral termination of the posterior auricle, overarching the umbonal cavity. The blade for muscular attachment is thin, short and decidedly flattened. It is inserted under the umbonal tooth, extending obliquely backward, the tip pointing to a position midway on the ventral edge of the posterior part. In *Teredo* s. s. the blade usually has its flat surface parallel to the ventral curvature of the interior of the shell, while here the revers is almost true, for the narrow edge almost parallels the interior. The extreme ventral portion of the median part is provided with a strong rounded knob, while the middle of the median portion is decidedly roughened within.

The type, Cat. No. 338240, U. S. N. M., measures from umbone to base 12.2 mm.; from the anterior to the posterior edge, 12.3 mm.; diameter, 13.4 mm.; palets, length 7.2 mm.; diameter 2.5 mm.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF APPARENTLY NEW SOUTH AMERICAN BIRDS.

BY W. E. CLYDE TODD.

Recent explorations in French Guiana and the lower Amazon by Mr. Samuel M. Klages in the interests of the Carnegie Museum have brought to light a number of apparently new birds, descriptions of which are presented herewith, while a few additional forms are described from other regions as the indirect result of comparisons with this new material. Three new subspecies of birds from the Santa Marta region are also characterized, making sixteen new names in all in the present paper, which is the eighth of the series to appear in these Proceedings. As before, the author's acknowledgments are due to Dr. Harry C. Oberholser for help and advice. Measurements are in millimeters, and the names of colors are mainly from Mr. Ridgway's "Color Standards and Color Nomenclature."

Myospiza aurifrons meridionalis, subsp. nov.

Similar to *Myospiza aurifrons aurifrons* (Spix) of northern Brazil, but general coloration paler, the upper parts more buffy, less grayish, with the streaking less distinct.

Type, No. 38,417, Collection Carnegie Museum, adult male; Rio Surutu, Bolivia, September 6, 1910; José Steinbach.

Brachyspiza capensis argentina, subsp. nov.

Similar in general to *Brachyspiza capensis capensis* of Guiana and Brazil, but averaging larger, with the bill more slender; the upper parts, wing-edgings, etc., duller, less rufescent; and the median crown-stripe broader. Wing (type), 71; tail, 63; exposed culmen, 11.5.

Type, No. 31,241, Collection Carnegie Museum, adult male; Rio Santiago (near Buenos Aires), Argentina, October 14, 1908; José Steinbach.

Volatinia jacarini atronitens, subsp. nov.

Similar to *Volatinia jacarini jacarini* (Linnæus), of Brazil, Bolivia, etc., but under wing-coverts and axillars mostly or entirely black.

A series of *Volatinia* from French Guiana, whence *Fringilla splendens* Vieillot was described, while not entirely typical of true *jacarini*, are clearly referable to that form, necessitating a new name for the northern race, which has heretofore passed as *splendens*.

Type, No. 166,744, Collection United States National Museum, adult male; Campeche, Campeche, Mexico, June 9, 1900; E. W. Nelson and E. A. Goldman.

Polioptila guianensis, sp. nov.

Adult male: above blackish plumbeous, the pileum very slightly deeper in tone; wings and their coverts dull black, with blackish plumbeous external margins, narrower on the primaries; three middle pairs of rectrices black; three outer pairs white, with sometimes a narrow black inner margin on the innermost; chin and upper throat whitish; lower throat and breast uniform gray (between dark gull gray and slate gray), passing into pure white on the abdomen and under tail-coverts; upper and under eyelids white; under wing-coverts and inner margins of remiges toward the base white; bill and feet black (in skin). Wing (type), 50; tail, 45; exposed culmen, 9; tarsus, 15.

Adult female similar, but colors lighter and duller, especially below; supraloral streak white.

Type, No. 62,036, Collection Carnegie Museum, adult male; Tamanoir, French Guiana, June 9, 1917; Samuel M. Klages.

Sublegatus glaber obscurior, subsp. nov.

Similar to *Sublegatus glaber glaber* Sclater and Salvin, but darker and duller in general coloration, the upper parts nearer dark olive gray than grayish olive; the throat and breast deeper gray; and the posterior under parts paler, duller yellow. Bill as large as in true *glaber*.

Type, No. 56,689, Collection Carnegie Museum, adult male; Cayenne, French Guiana, March 7, 1917; Samuel M. Klages.

Sayornis latirostris fumigatus, subsp. nov.

Similar to *Sayornis latirostris latirostris* (Cabanis and Heine), but general coloration obviously darker and blacker.

Type, No. 44,508, Collection Carnegie Museum, adult female; Don Diego, Santa Marta, Colombia, January 20, 1914; M. A. Carriker, Jr.

Sirystes albocinereus subcanescens, subsp. nov.

Similar to *Sirystes albocinereus albocinereus* Sclater and Salvin, but bill larger (20 mm.), and throat and breast much grayer, the flammulations more distinct and more extended posteriorly.

Type, No. 68 697, Collection Carnegie Museum, adult female; Upper Rocana, northern Pará, Brazil; June 27, 1918; Samuel M. Klages.

Cercomacra tyrannina laeta, subsp. nov.

Adult male very similar to that of *Cercomacra tyrannina tyrannina* of the Bogotá region of Colombia, but the wings and tail generally duller and more brownish. Adult female constantly paler and more uniform below than in *tyrannina,* with less brownish wash on the sides and flanks.

Judging from the diagnoses, this form cannot be the same as the races recently described from British Guiana and western Ecuador, respectively (cf. Chubb, Bulletin British Ornithologists' Club, vol. 38, 1918, 85).

Type, No. 69,242, Collection Carnegie Museum, adult female; Benevides, Pará, Brazil, September 5, 1918; Samuel M. Klages.

Myrmopagis paraensis, sp. nov.

Adult male: above plain slate gray, the sides of the head with some whitish mottling or streaking; scapulars white, the longer ones slate gray, externally margined with white, bordering a streak of black; lesser and middle coverts white, tipped with black; greater coverts similar, but more or less slate gray medially; remiges dusky, externally slate gray, with whitish inner margins, and the two outermost primaries with narrow white outer margins; tail black, the feathers edged with slate color, the middle rectrices entirely slate color; all the rectrices narrowly tipped with white; throat and middle of the breast black; sides of the breast plain slate gray like the back; rest of the under parts plain light gray (gull gray), fading to nearly white on the crissum; under wing-coverts similar, mottled with black toward the outer edge; bill and feet black (in skin). Wing (type), 62; tail, 32; exposed culmen, 11.5; tarsus, 15.

Female: above, including external margins of wings and tail, light brownish olive; tips of wing-coverts paler (isabella color); inner margins of remiges whitish; tail-feathers with slight buffy terminal spots; sides of head and entire under surface plain deep cinnamon buff, the sides and flanks with darker shading; under wing-coverts also deep cinnamon buff; bill black above, pale below; feet black (in skin).

This is the *Myrmotherula longipennis* of Hellmayr, Novitates Zoologicæ XII, 1905, p. 286; XIII, 1906, p. 369, etc.; also of von Ihering, Revista Museu Paulista, VI, 1904, p. 441, pl. 15, fig. 2, which is an excellent representation. *M. longipennis,* however, as shown by the series consulted in this connection, has a very differently colored female from the present form, although the males are similar. *M. iheringi* Snethlage (Ornithologische Monatsberichte, XXII, 1914, p. 41) cannot be the same if the description is correct.

Type, No. 69,244, Collection Carnegie Museum, adult male; Benevides, Pará, Brazil, September 5, 1918; Samuel M. Klages.

Formicarius ruficeps orinocensis, subsp. nov.

Similar to *Formicarius ruficeps amazonicus* Hellmayr, but decidedly more brownish (nearest raw umber), less olivaceous above, and on the wings and tail; pileum obviously darker (chestnut instead of Sanford's

brown), with the lateral margin but little paler; and the under wing-coverts and base of the primaries below deeper rusty buff.

Type, No. 32,186, Collection Carnegie Museum, adult male; La Lajita, Rio Caura, Venezuela, November 3, 1909; M. A. Carriker, Jr.

Sclerurus rufigularis fulvigularis, subsp. nov.

Near *Sclerurus rufigularis rufigularis* von Pelzeln of northern Brazil, but throat and breast paler (more buffy, less rufescent) and less uniform, with distinct flammulations.

Type, No. 60,822, Collection Carnegie Museum, adult male; Tamanoir, French Guiana, April 23, 1917; Samuel M. Klages.

Microxenops milleri guianensis, subsp. nov.

Similar to *Microxenops milleri milleri* Chapman, from the headwaters of the Orinoco, with which it agrees in pattern of coloration, but bill more slender, and tail longer; wing-coverts more rusty, and bend of wing and under wing-coverts deeper in tone; pileum darker, with the stripes more rusty and more sharply defined. Wing (type), 66; tail, 38; exposed culmen, 12; tarsus, 15.

Type, No. 61,307, Collection Carnegie Museum, adult male; Tamanoir, French Guiana, May 8, 1917; Samuel M. Klages.

Furnarius leucopus exilis, subsp. nov.

Similar to *Furnarius leucopus agnatus* Sclater and Salvin, but decidedly more deeply colored throughout, and wing and bill shorter. Wing (type), 89; tail, 52; exposed culmen, 23.

Type, No. 49,568, Collection Carnegie Museum, adult male, Fundacion, Santa Marta, Colombia, October 11, 1915; M. A. Carriker, Jr.

Dendrocolaptes certhia medius, subsp. nov.

Similar to *Dendrocolaptes certhia certhia* (Boddaert), of Guiana, etc., but under parts obviously paler, less rufescent, with the cross-barring narrower and less distinct.

Type, No. 69,352, Collection Carnegie Museum, adult male; Benevides, Pará, Brazil, September 17, 1918; Samuel M. Klages.

Veniliornis oleaginus exsul, subsp. nov.

Similar to *Veniliornis oleaginus fumigatus* (Lafresnaye and D'Orbigny), but averaging darker, deeper, brownish olive below (in the dark phase), and obviously more uniform.

Type, No. 38,652, Collection Carnegie Museum, adult male; Sierra Nevada de Santa Marta (6000 feet), Colombia, April 1, 1912; M. A. Carriker, Jr.

Nyctipolus maculosus, sp. nov.

Above mottled gray and rusty buff, the pileum with broad and distinct mesial streaks of black, narrowing on the hindneck; scapulars with broad outer margins of ochraceous buff, preceded by a black area; lesser wing-coverts black, with irregular bars and spots of chestnut; middle and greater coverts similar, with terminal spots of buffy or ochraceous buff; primaries

black, the four outer ones with a white spot about midway of their length, confined to the inner web on the outermost, and increasing in size towards the inner feathers, being 7 mm. wide on the fourth primary (from the outside), but merely indicated on the fifth; secondaries black, with incomplete and irregular bars of chestnut; sides of head rich brown (argus brown), the auricular region almost uniform, but elsewhere mottled with black; chin and upper throat mottled black and antique brown; sides of the throat silky white, forming two distinct spots, separated by a line of black-tipped ochraceous buff feathers; breast and rest of under parts rich buff, paler posteriorly, barred with black, this barring more regular on the flanks and crissum; under wing-coverts similar; tail black, the outermost pair of rectrices with an oblong white spot on the inner web at the tip, the next two pairs with broad white tips on both webs (25 mm. long), and all marked with indistinct and irregular bands of mottled gray or ochraeous, very conspicuous on the middle feathers, but merely indicated on the outermost. Wing (type), 139; tail, 112; exposed culmen, 8; tarsus, 17.5.

Type, No. 60,854, Collection Carnegie Museum, adult male; Tamanoir, French Guiana, April 24, 1917; Samuel M. Klages.

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PROCEEDINGS
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FIVE NEW SPECIES OF BIRDS FROM CAVE DEPOSITS IN PORTO RICO.

BY ALEXANDER WETMORE.

During identification of a considerable collection of bird bones secured in Porto Rican Caves by H. E. Anthony of the American Museum, several species new to science have come to light. A complete report on the entire collection is in course of preparation, but as it is not practicable to complete it at the present time the new forms are presented in the following diagnoses. It will be seen that the cave fauna of the island offers avian species as remarkable as those that have been described by Mr. Anthony among mammals.[1]

Polyborus latebrosus, sp. nov.

Characters.—Metacarpus similar to that of *Polyborus cheriway* (Jacquin)[2] but slightly larger; first metacarpal proportionately higher, more massive especially at the base (when viewed from behind), and with less inward flexure at the tip; proximal end of third metacarpal with surface slightly excavated to form a concavity; excavation anterior to pisiform process more distinctly delimited; inner margin of condyle raised in a distinct crest.

Description.—Type, Cat. No. 4921, Dept. Vert. Pal., American Museum Nat. Hist., proximal end of right metacarpus, from cave on the property of Don Gervacio Toraño, near Utuado, Porto Rico, collected July 2, 1916, by H. E. Anthony.

Metacarpus with first metacarpal strong and massive especially at the base; head produced and slightly enlarged at extremity, showing a very slight inward flexure; articular surface for pollex broadened, supported by a basal buttress; a slight notch posteriorly at base marking junction

[1] The Indigenous Land Mammals of Porto Rico, Living and Extinct. Mem. Amer. Mus. Nat. Hist., N. S., Vol. II, Oct. 12, 1918, pp. 333–435, 20 plates, 55 text figures.

[2] Skeletons of *Polyborus cheriway* used in the present studies come from Florida.

with second metacarpal; two minute foramina on either side at base; a shallow anterior carpal fossa on posterior face; outline of carpal articulation viewed from inner side forming part of an ellipse with axis vertical, the posterior margin forming one side of the ellipse; upper margin here produced in a distinct ridge; posterior carpal fossa slight; pisiform process low; internal ligamentous fossa deeply impressed; a distinct elongate fossa on inner surface anterior to pisiform process, sharply marked by inner extension of margin of third metacarpal as a distinct ridge; base of second metacarpal strong and heavy; lower surface of third metacarpal distinctly excavated so that it is concave.

Measurements.—(Of type.) Extreme height (through crest of first metacarpal) 16 mm.; length of first metacarpal 9.2 mm.; diameter of base of first metacarpal (behind expansion for pollex) 2.5 mm.

Range.—Known only from cave on the property of Don Gervacio Toraño near Utuado, Porto Rico. (Extinct.)

Remarks.—The present species as shown by the characters of the few fragments available seems to stand intermediate between *Polyborus cheriway* (Jacquin) and *P. plancus* Miller. Its discovery marks an extension of range for the genus, as *P. cheriway*, its nearest neighbor in a geographical sense, does not pass in the West Indies beyond Cuba and the Isle of Pines, while on the southward it reaches only to Trinidad and certain small islands near the coast of Venezuela.

Gallinago anthonyi, sp. nov.[1]

Characters.—Humerus similar to that of *Gallinago delicata* (Ord), but distinctly larger and longer; ectepicondylar process shorter; crista superior relatively smaller.

Description.—Type, Cat. No. 4922, Dept. Vert. Pal., American Museum Nat. Hist., right humerus, from Cueva Catedral, near Morovis, Porto Rico, collected in July, 1916, by H. E. Anthony.

Humerus with head comparatively broad, crista superior relatively low and slightly developed, projecting outward nearly at right angles to shaft, with the projecting margin strongly rounded in outline; fossa subtrochanterica rather shallow; no pneumatic foramen; nutrient foramen situated well above middle of bone 17 mm. from extremity of caput humeri; shaft comparatively strong, much flattened and broadened toward distal end; base of ectepicondylar process low, summit distant 5.6 mm. from extremity of radial condyle (tip of process broken away); depression for brachialis inferior broad and well marked; ulnar condyle elongate.

Measurements.—(Of type.) Total length 43.4 mm.; greatest breadth of head 10.7 mm.; lateral diameter of shaft at center 3.4 mm.; intercondylar breadth 7 mm.

Range.—Known from Cueva Catedral and Cueva Clara, near Morovis, Porto Rico. (Extinct.)

Remarks.—This peculiar snipe is distinctly larger than *Gallinago delicata*

[1] Named in honor of H. E. Anthony, of the American Museum of Natural History.

and shows some affinities with the larger jack snipes found in South America. It seems thus to introduce an element hitherto unknown in the West Indian Fauna.

Oreopeleia larva, sp. nov.

Characters.—Metatarsus similar to that of *Oreopeleia leucometopius* Chapman from Santo Domingo, but distinctly longer.

Description.—Type, Cat. No. 4923, Dept. Vert. Pal., American Museum Nat. Hist., left metatarsus, from La Cueva Clara, near Morovis, Porto Rico, collected in July, 1916, by H. E. Anthony.

External glenoid facet concave, with a high external border near center, rudely elliptical in outline; internal glenoid facet also with high external border, nearly circular in form; intercondylar prominence strong, in form resembling a truncated cone, with the apical surface sloping anteriorly; anterior semilunar groove very slight; anterior surface of bone below head excavated in a long groove that lies mainly on the inner side; both external and internal superior foramina present, the first penetrating through to opposite side; insertion of tibialis anticus tendon slight; outer anterior margin ridged to a point below the anterior groove where the entire bone shows a broad flattened surface; inner crest of talon very slightly indicated; outer crest strong and heavy with the posterior semilunar groove well developed; outer head of talon with one median perforation and two external grooves, that are not closed; posteriorly the talon is produced in a thin sharp ridge that descends rapidly to merge with the body of the bone at the anterior third of its length; junction of talon with shaft marked externally by a low ridge that curves anteriorly; internal margin of bone produced anteriorly as a thin plate that slopes in a curve to join the talon and that has a sharp outer margin; shaft greatly flattened distally; a raised line extending from the crest of the talon down the center of the shaft behind to curve outward finally to the base of the outer trochlea; another less definite line passes to the inner trochlea; inner trochlea produced outward and backward as an angular projection with a flattened lateral point; middle trochlea projecting well beyond other two, rounded in outline, flattened laterally, with excavated sides and a deep median channel; outer trochlea strong and heavy, produced outwardly and posteriorly and excavated behind, where it is also heavily grooved; a large external inferior foramen and a faintly indicated internal one.

Measurements.—(Of type.) Total length 39.5 mm., smallest transverse diameter of shaft 2.5 mm., breadth of head 6.7 mm., breadth across trochlea 7 mm., depth through talon 6.5 mm.

Range.—Known from Cueva Clara and Cueva Catedral near Morovis, and a cave on the property of Don Gervacio Toraño near Utuado. (Extinct.)

Remarks.—The diagnosis given for this Quail-Dove is necessarily brief because of lack of osteological material for comparison, but is sufficient to point out the character of greater length of leg distinguishing

it. It is evidently closely allied to *Oreopeleia leucometopius* Chapman from Santo Domingo and apparently was a Porto Rican representative of the *Oreopeleia caniceps-leucometopius* group of species. The only other species with which *larva* might be confused is *Oreopeleia martinica* from the Lesser Antilles, a species that on the average has a distinctly shorter tarsus according to Mr. Ridgway[1] (from 29.5 to 36.5 mm. irrespective of sex). Exceptional individuals of *martinica* have the tarsus nearly as long as in *O. larva*. These, however, may be readily distinguished from *larva* by the more slender shaft of the metatarsus, a character in which *martinica* agrees with the smaller *Oreopeleia montana*. At least ten or a dozen individuals of *larva* are represented in the material at hand so that it would appear that at one time this Quail-Dove had been a common species.

Tyto cavatica, sp. nov.

Characters.—Metatarsus similar to that of *Tyto glaucops* (Kaup) from Santo Domingo, but with internal head of talon larger and much longer, the lower margin more elongated; tubercle for insertion of tibialis anticus tendon heavier.

Description.—Type, Cat. No. 4924, Dept. Vert. Pal., American Museum Nat. Hist., proximal three-fourths of a left metatarsus from cave on the property of Don Gervacio Toraño, near Utuado, Porto Rico, collected July 2, 1916, by H. E. Anthony.

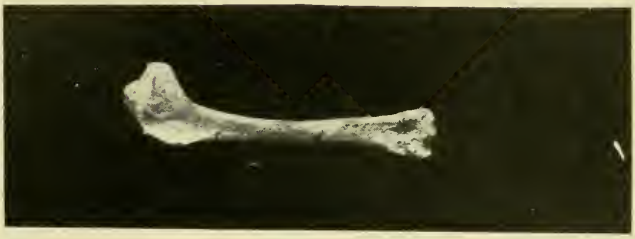
Metatarsus with base supporting inner head of talon long, sloping gradually below and truncate in front (crest of talon missing in type); posterior semi-lunar groove deep and narrow; anterior semi-lunar groove shallow; inner glenoid facet moderately impressed and concave; outer glenoid facet smooth without marked depression; entire posterior face of bone deeply grooved; ridge bearing inner head of talon swung over slightly toward center from inner margin, with a marked depression on inner face of the crest; outer side of metatarsus flattened, with angular margins, becoming narrower in a curving line toward head of bone, and expanding again slightly to support outer glenoid surface; anterior surface of bone excavated proximally in an elongate, roughly triangular groove; tubercle for insertion of tibialis anticus long and strong, extending well toward head of bone; lower end of bone with a distinct forward flexure; no osseous loop for extensor digitorum communis tendon.

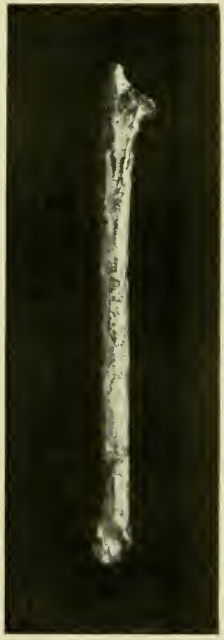
Measurements.—(Of type.) Lateral diameter of head across articular surface 10 mm.; lateral diameter of shaft near center 4 mm.; length of base of inner head of talon 8.7 mm.

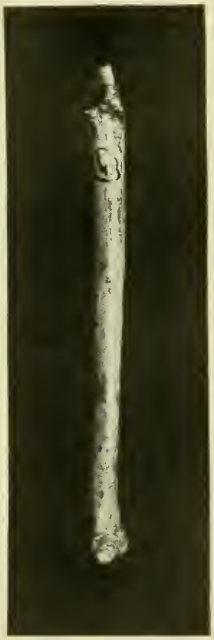
Range.—Known only from cave on property of Don Gervacio Toraño, near Utuado, Porto Rico. (Extinct.)

Remarks.—This species is known from the proximal ends of right and left metatarsi and parts of two tibio-tarsi all taken in one cave. Apparently two individuals are represented as otherwise the range in pro-

[1] Bull. 50, U. S. Nat. Mus., Vol. 7, 1916, p. 477.







FIGS. 1 AND 2.—Right humerus, type of *Gallinago anthonyi*.
FIGS 3 AND 4.—Right ulna, type of *Corvus pumilis*.
FIGS. 5 AND 6.—Broken right metacarpus, type of *Polyborus latebrosus*.

Figs. 1 and 2.—Left metatarsus, type of *Oreopeleia larva*.
Figs. 3 and 4.—Broken left metatarsus, type of *Tyto cavatica*.
Figs. 5 and 6.—Broken right metatarsus of *Tyto cavatica*.

portions in the different bones is without explanation. *Tyto cavatica* is a small barn owl of the group of species containing *Tyto glaucops, insularis* and *bargei* and like these is distinct specifically from *Tyto perlata* of the North American continent, Cuba and the Bahamas.

Corvus pumilis, sp. nov.

Characters.—Ulna similar to that of *Corvus palmarum* Württemberg, but distinctly longer, olecranon relatively longer, heavier and broader at tip; external margin bounding carpal articulation more produced; and shaft compressed to form an angular margin on inner side directly above carpal articulation.

Description.—Type, Cat. No. 4925, Dept. Vert. Pal., American Museum Nat. Hist., right ulna, from Cueva San Miguel, near Morovis, Porto Rico, collected in July, 1916, by H. E. Anthony.

Ulna with olecranon produced and strong, tip broad and blunt on the end, where it is impressed by an indistinct shallow pit; internal glenoid surface broadly elliptical, placed obliquely to the axis of the bone and with a shallow raised margin; external glenoid surface produced as a thin flattened plate, with outer margin slightly rounded and postero-external edge produced to form a right angle; insertion of external portion of triceps marked by an angular ridge; a distinct external ridge with an acute margin on shaft immediately below head; shaft with a slight external convexity; nutrient foramen on inner surface, 25 millimeters from extremity of olecranon; paillae for attachment of secondaries fairly prominent; external margin of carpal head produced, extending slightly beyond margin of shaft.

Measurements.—(Of type.) Total length 68 mm., diameter of shaft on external surface 4 mm.

Range.—Known only from Cueva San Miguel near Morovis, Porto Rico. (Extinct.)

Remarks.—This species is represented by a single ulna from Cueva San Miguel near Morovis. From *Corvus leucognaphalus,* known as a living bird in Porto Rico, the present species is distinguished readily by its smaller size. In study skins of four females of *C. leucognaphalus* that I collected during 1912 on the eastern slopes of El Yunque de Luquillo in Porto Rico, the ulna measures 75 mm. in length in three specimens, and 76 mm. in the fourth. As the female in *leucognaphalus* is distinctly smaller than the male it will be seen at once that the ulna from Morovis, with a total length of 68 mm., lies well outside the range of variation in *leucognaphalus.* In a skeleton of *C. palmarum,* the small crow from Santo Domingo, the ulna measures 62 mm. The species described here is intermediate in size between *palmarum* and *leucognaphalus* and thus is larger also than *C. minutus* from Cuba, or the peculiar slaty colored *C. jamaicensis* from Jamaica.

In former years, therefore, there were two types of the genus *Corvus* on Porto Rico as there are today on Cuba and on Santo Domingo.

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PROCEEDINGS
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MUTANDA ORNITHOLOGICA.

IX.

BY HARRY C. OBERHOLSER.

Further notes[1] on untenable names of birds are furnished below. These refer to species in the families Corvidae, Motacillidae, Sylviidae, Turdoididae, and Timaliidae.

Family CORVIDAE.

Dendrocitta sinensis (Latham).

The name *Dendrocitta sinensis* for a Chinese jay must now be changed, since its basis, *Corvus sinensis* Latham (Index Ornith., I, 1790, p. 161; Macao Island, China), is found to be preoccupied by *Corvus sinensis* Gmelin (Syst. Nat., I, i, 1788, p. 372; China) for another and unidentified species. Since no other name is available for *Dendrocitta sinensis*, we propose to call it **Dendrocitta celadina,** nom. nov.

Family MOTACILLIDAE.

Motacilla longicauda Rüppell.

The name *Motacilla longicauda* Rüppell (Neue Wirb. Faun. Abyss., Vög., 1835, p. 84, pl. XIX, fig. 2; Province of Simen, Abyssinia), for a well known African wagtail, is untenable on account of the previous *Motacilla longicauda* Gmelin (Syst. Nat., I, ii, 1789, p. 954, China), a synonym of *Sutoria sutoria* (Forster). Its only synonym, *Motacilla longicaudata* Grant and Reid (Ibis, ser. 8, I, No. IV, October, 1901, p. 630; nom. emend. pro *Motacilla longicauda* Rüppell), is preoccupied by *Motacilla longicaudata* Hermann (Observ. Zool., 1804, p. 210; no locality). A new specific designation is therefore necessary for *Motacilla longicauda* Rüppell, and we provide it in **Motacilla rhadinura,** nom. nov.

[1] For the eight previous articles in this series, *cf.* Proc. Biol. Soc. Wash., 30, March 31, 1917, pp. 75–76; July 27, 1917, pp. 125–126; *ibid.*, 31, May 16, 1918, pp. 47–49; November 29, 1918, pp. 125–126; *ibid.*, 32, February 14, 1919, pp. 7–8; April 11, 1919, pp. 21–22; June 27, 1919, pp. 127–128; December 31, 1919, pp. 239–240.

FAMILY SYLVIIDAE.

Eremomela flaviventris (Burchell).

The name of the South African warbler now known as *Eremomela flaviventris* is invalidated because it was originally described as *Sylvia flaviventris* Burchell (Trav. South Afr., I, 1822, p. 335, note; Asbestos Mountains, 14 miles north of the Orange River, Griqualand West, South Africa), and because this is preoccupied by *Sylvia flaviventris* Vieillot (Nouv. Dict. d'Hist. Nat., XI, 1817, p. 241; Paris, France), which is now relegated to the synonymy of *Phylloscopus trochilus* (Linnaeus). It has apparently no synonym, and we therefore rechristen it **Eremomela griseoflava perimacha,** nom. nov. It is here treated as a subspecies of *Eremomela griseoflava* Heuglin (Journ. f. Ornith., 1862, p. 40), since this name now becomes the earliest one among all the forms of this species and must, therefore, from a nomenclatural standpoint, become the typical race. These subspecies will now stand as follows:

Eremomela griseoflava griseoflava Heuglin.
Eremomela griseoflava abdominalis Reichenow.
Eremomela griseoflava sharpei Reichenow.
Eremomela griseoflava perimacha Oberholser.
Eremomela griseoflava erlangeri Reichenow.
Eremomela griseoflava flavicrissalis Sharpe.

FAMILY TURDOIDIDAE.

Crateropus griseus (Gmelin).

The *Turdus griseus* of Gmelin (Syst. Nat., I, ii, 1769, p. 824; Coromandel Coast, India), which is now in use for an Indian babbling thrush in the combination *Crateropus griseus,* is preoccupied by *Turdus griseus* Boddaert (Tabl. Planch. Enlum. d'Hist. Nat., 1783, p. 39; Cayenne), which is now called *Microrhopias grisea* (Boddaert). Dr. C. W. Richmond has already called attention (Proc. U. S. Nat. Mus., LIII, August 16, 1917, p. 627) to the fact that the generic name *Crateropus* Swainson must be superseded by *Turdoides* Cretzschmar. In view of this and of the fact that *Crateropus griseus,* lacking synonyms, is in need of a new name, we propose that it be known as **Turdoides polioplocamus** Oberholser, nom. nov.

FAMILY TIMALIIDAE.

Arrenga cyanea (Horsfield).

This Javan species, the *Turdus cyaneus* of Horsfield (Trans. Linn. Soc. Lond., XIII, May, 1821, p. 149; Java), can no longer be called by its present specific name, because this is ineligible for further use on account of the earlier *Turdus cyaneus* of Müller (Vollständ. Natursyst. Suppl., 1776, p. 145; Cape of Good Hope, southern Africa), applied to some other bird. The next and only other available specific designation appears to be *Pitta glaucina* Temminck (Nouv. Rec. Planch. Col. d'Ois., II, livr. 33, 1823, pl. 194; Java); and the name of this bird, should, therefore, henceforth be *Arrenga glaucina* (Temminck).

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PROCEEDINGS

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DESCRIPTIONS OF FIVE NEW SUBSPECIES OF CYORNIS.

BY HARRY C. OBERHOLSER.

The following new forms of the genus of Flycatchers commonly known as *Cyornis* Blyth are in the United States National Museum collection. They were brought to light in an investigation of the forms of this genus, having in view a monograph of the group, but as this has now been undertaken by Mr. C. Boden Kloss, it seems advisable to publish preliminary descriptions of these new forms.

Cyornis rubeculoides chersonesites, subsp. nov.

Chars. subsp.—Similar to *Cyornis rubeculoides rubeculoides* from Nepal, but male darker above; more whitish (less rufous) on the posterior lower parts; female darker and less rufescent (more grayish) above; throat more deeply or brightly ochraceous.

Description.—Type, adult male; No. 160623, U. S. Nat. Mus.; Trang, Lower Siam, Malay Peninsula, February 15, 1897; Dr. W. L. Abbott. Forehead and short superciliary stripe king's blue, but the posterior portion of the superciliary stripe venetian blue; pileum and cervix indigo blue; remainder of upper parts dark tyrian blue, verging, on the rump and upper tail-coverts, toward dark orient blue; tail brownish black, with edgings of dark blue, between dark orient blue and dark tyrian blue; wings chaetura drab, with edgings of blue of the same shade as the back, but lesser coverts between eaton blue and jay blue; nasal bristles and lores dull black; sides of head and of neck like the cervix; chin, throat (all but middle line) and sides of breast bluish black; middle line of throat between ochraceous buff and ochraceous orange; jugulum and upper breast between xanthine orange and sudan brown; rest of lower parts white, the sides anteriorly a little streaked with the color of the breast, posteriorly together with the flanks, washed with buff; thighs dull black washed with deep blue; axillars and inner under wing-coverts dull light buff, outer under wing-coverts

chaetura black margined with the blue of the wing edgings; "bill black; iris dark brown."

Measurements of type.—Wing, 70 mm.; tail, 58.5; exposed culmen, 12; tarsus, 18.

Geographic distribution.—Malay Peninsula and southern Tenasserim.

Cyornis banyumas nesaea, subsp. nov.

Chars. subsp.—Similar to *Cyornis banyumas tickelliae* from India, but upper parts darker, and posterior lower surface much more extensively whitish, the crissum entirely white.

Description.—Type, adult male; No. 201395, U. S. Nat. Mus.; Walgame, Ceylon; May 3, 1894. Forehead and superciliary stripe dull yale blue; upper parts deep delft blue, posteriorly rather lighter and brighter; upper tail-coverts between blanc's blue and dark orient blue; tail chaetura black, the outer webs basally like the upper tail-coverts, but distally duller and of a darker blue; wings chaetura drab, the primaries and secondaries edged on their outer webs with the color of the back, the superior wing-coverts dull gendarme blue; lores and nasal bristles dull black; sides of head, neck, and of breast, like the cervix; anterior part of chin bluish black; throat and posterior portion of chin, between cinnamon buff and antimony yellow; jugulum and upper breast, between clay color and yellow ochre; lower breast and abdomen white; sides and flanks, between warm buff and light buff; thighs dull black, washed with dark blue, the feathers edged with whitish; axillars light buff; under wing-coverts chaetura black, the inner feathers edged broadly with white, and the outer feathers broadly margined with the blue of the upper wing-coverts.

Measurements of type.—Wing, 68 mm.; tail, 58; exposed culmen, 11.5; tarsus, 16.5

Geographic distribution.—Ceylon.

Cyornis banyumas calocephala, subsp. nov.

Chars. subsp.—Similar to *Cyornis banyumas nesaea* from Ceylon, but upper parts much darker and less greenish; black chin area larger; throat and breast much more deeply rufous; crissum and sides also deeply rufous instead of almost pure white.

Type.—Adult male; No. 180606, U. S. Nat. Mus.; Tanjong Tedong, Banka Island; June 5, 1904; Dr. W. L. Abbott.

Measurements of type.—Wing, 71.5 mm.; tail, 56; exposed culmen, 11.5; tarsus, 17.

Geographic distribution.—Banka Island off the southeastern end of Sumatra.

Remarks.—This new form is apparently most closely allied to *Cyornis banyumas rufigastris* (Raffles) from Sumatra, but from this race it differs in its smaller size; much darker, more purplish blue upper parts and sides of neck, and much more deeply ochraceous crissum and anterior lower parts It is apparently confined to the island of Banka.

Cyornis elegans rupatensis, subsp. nov.

Chars. subsp.—Similar to *Cyornis elegans elegans* from northern and western Sumatra, but much darker above and on throat; the ochraceous of breast darker; and posterior lower parts more strongly tinged with ochraceous.

Description.—Type, adult male; No. 181145; Rupat Strait, southeastern Sumatra; February 26, 1906; Dr. W. L. Abbott. Forehead and superciliary stripe, rather dark salvia blue; pileum, cervix, scapulars, and back, between Hortense blue and dusky blue, the pileum darker, the middle of upper back somewhat lighter and more like eaton blue; rump and upper tail-coverts, between methyl blue and light methyl blue; tail dull black, the edges of the rectrices prussian blue; wings chaetura black, the edges of the feathers between prussian blue and cyanine blue, the lesser and middle wing-coverts lighter; nasal bristles and lores, dull black washed with dark blue; sides of head, of neck, and of breast, like the cervix; chin and throat, eaton blue; jugulum and upper breast, ochraceous tawny; sides and flanks, between buff and pale buff; middle of lower breast, together with abdomen and crissum, dull creamy white, the crissum slightly washed with dull buff; thighs dull black washed with deep blue, the feathers edged with whitish; axillars dull white washed with bluish; under wing-coverts chaetura drab, the antero-exterior portion blue like the lesser upper wing-coverts, the intero-posterior portion pale dull buff.

Measurements of type.—Wing, 74.5 mm.; tail, 58; exposed culmen, 12; tarsus, 18.5.

Geographic distribution.—Vicinity of Rupat Strait, along the southeastern coast of Sumatra.

Cyornis elegans antelia, subsp. nov.

Chars. subsp.—Similar to *Cyornis elegans rupatensis* from Rupat Strait, southeastern Sumatra, but upper parts lighter and rather more greenish; throat paler; jugulum darker; posterior lower parts more purely white (less tinged with buff).

Type.—Adult male; No. 248067, U. S. Nat. Mus.; Long Iram, eastern Borneo; March 7, 1914; H. C. Raven; original number 1262.

Measurements of type.—Wing, 77 mm.; tail, 60.5; exposed culmen, 12; height of bill at base, 4.5; tarsus, 17.5; middle toe without claw, 12.

Geographic distribution.—Born o.

Remarks.—This new race differs from *Cyornis elegans elegans* from western and northern Sumatra in the paler ochraceous of the breast, and the more whitish lining of the wing in the male; and in the slightly darker, less greenish, upper parts and less deeply rufous lower parts of the female. It is apparently confined to Borneo.

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SICYDIUM MONTANUM, A NEW SPECIES OF GOBY FROM VENEZUELA.

BY CARL L. HUBBS.

Dr. Ned Dearborn collected on February 1, 1908, in a mountain brook at Macuto, Caracas, Venezuela, eleven specimens of a small goby belonging to the genus *Sicydium*. The species is undescribed, and related to *S. punctatum* Perugia and *S. buscki* Evermann and Clark, but differs from both in its still larger scales, in coloration, and in other characters.

Sicydium montanum, new species.

Holotype.—A specimen 29 mm. long (to caudal), Cat. No. 9053, Field Museum of Natural History; collected by Ned Dearborn in a mountain brook at Macuto, Caracas, Venezuela (February 1, 1908). *Paratypes.*—Ten specimens taken with the holotype, 21 to 28 mm. long.

Dorsal rays, VI-I, 10; anal, I, 9 (9 or 10).

Scales comparatively large, about 48 (to 46) in a median series from upper edge of pectoral to end of last vertebra. Each scale deeply sculptured over the greater portion of its surface by long basal radii, but bearing a few strong hastate spines in a single series near its posterior margin. Scales obsolescent above pectoral fins and on nape, absent from belly.

Body slender, scarcely compressed anteriorly; greatest depth, 5.4 (to about 7.0) in body; depth of caudal peduncle, 1.6 in its length from end of anal base, 2.3 (to 2.5) in head.

Head blunt, and a little depressed, flattened above; its length, 4.25 (4.0 to 4.5). Eye placed high, its upper edge entering the profile of the head; its length, about 4.0 in head; interorbital a little narrower than eye. Snout blunt, overhanging the inferior mouth, its length 2.8 in head (shorter in young, in which it is about as long as the eye, and contained about 4.0 times in the head. Upper jaw, 2.5 in head, extending horizontally backward slightly beyond the vertical from middle of pupil (mouth smaller in young). Premaxillary teeth brownish, set comb-like in a single series along a wide arch. Mandible included; its teeth entirely pale, fewer,

larger and less regularly arranged than those of the upper jaw. Gill-slit about as wide as gape.

Spinous dorsal rather high, the second and third spines longest, 1.35 (1.25 to 1.7) in head, equal to length of anal base or to length of pectoral fin; interdorsal space about as long as eye; second dorsal originating before vertical from anus, its height about 2.0 in head. Caudal fin rounded, as long as head. Length of pelvic disc, 1.7.

Color pattern rather sharply defined; six cross bars or blotches, extending downward across middle of sides, present between middle of spinous dorsal and caudal base, all more or less fused medially to form a longitudinal streak. Three narrow and irregular bars diverging downward on each side from the nape. Sides of head and snout darkened; under surface of head not punctate. Spines of first dorsal dark; second dorsal fin conspicuously spotted or blotched with dark; the dark spot on base of caudal widely fused with last blotch on body; anal fin with a blackish subterminal streak; pectoral fins with basal mottling; pelvics unmarked; all of the fins more or less dusky.

In some specimens the bars are more sharply distinct than in the type, while in others the longitudinal dark band, formed by the fusing of the bars along the middle of the sides, is more conspicuous, and is continued forward around the snout. In some paratypes the bars diverge upward to enclose a light area between the two arms of a V-shaped mark, and the bars before the spinous dorsal are divided to form five or six zebra-like markings.

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PROCEEDINGS
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DESCRIPTION OF A NEW CHIPMUNK FROM GLACIER NATIONAL PARK, MONTANA.

BY ARTHUR H. HOWELL.

Faunal studies of the chipmunks of Montana have shown the necessity for recognizing an undescribed species of *Eutamias* from the eastern slopes of the main Rocky Mountain divide, specimens of which have been in the Biological Survey collection for many years. It may be described as follows:

Eutamias ruficaudus, sp. nov. Rufous-tailed Chipmunk.

Type.—No. 72294, U. S. National Museum, Biological Survey Collection; adult male, skin and skull; from Upper St. Mary's Lake, Montana; collected May 30, 1895, by A. H. Howell; original number 27.

Specific characters.—Similar to *Eutamias umbrinus*, but coloration decidedly more rufescent; head and face more tawny (less grayish); dorsal stripes and spots behind ears less whitish; under side of tail deeper reddish.

Description of type (unworn winter pelage).—Sides of nose cinnamon; top of head and face, cinnamon, mixed with grayish white and bordered with fuscous; stripe from tip of nose above the eye to anterior base of ear and another beneath the eye to posterior base of ear buffy white, these light stripes bordered on each side with fuscous stripes mixed with tawny (the median one in front of and behind the eye); ears fuscous, with a rather broad band of pinkish buff on posterior margin; inside of ear clothed with tawny hairs; median dorsal stripe (extending from crown to root of tail) and lateral pair of dark stripes black or fuscous black, slightly mixed with tawny; alternate dorsal stripes (four in number) grayish white, mixed with tawny, the median pair shading anteriorly into the color of the crown, the outer pair bordered beneath with an indistinct stripe of fuscous black; sides of body deep tawny; thighs and rump mixed cinnamon and grayish white, producing a drabby tone; fore- and hind-feet pinkish cinnamon, the toes washed with pinkish buff; underparts grayish white, faintly washed with pale pinkish buff; under side of tail, Sanford brown,

bordered with fuscous black and edged with pinkish cinnamon; same shades above, but colors more intimately mixed and the blackish more prominent.

Skull.—Closely similar to that of *umbrinus*, but averaging slightly larger; and broader across zygomata.

Measurements.—*Type* (male adult); total length, 227 mm.; tail vertebrae, 118; hind foot (dry) 33.8. *Skull.*—Occipito-nasal length, 35; zygomatic breadth, 19.5; mastoidal breadth, 15.6; least interorbital breadth, 7.6; length of nasals, 11.2.

Remarks.—This handsome chipmunk is apparently a well-marked species, belonging in the *quadrivittatus-umbrinus* group, but not at present known to intergrade with *umbrinus*. It bears some resemblance to *Eutamias felix* from the coast region of British Columbia, but may be distinguished from that species by its whiter belly, more reddish tail, more whitish dorsal stripes, and larger skull with longer rostrum.

The species is represented by a series of 26 specimens from the Glacier Park region (St. Mary's Lake, Bear Creek, Summit, Paola, and Lake McDonald) and 13 specimens from the Bitterroot Mountains (Florence, Bass Creek, and mountains east of Corvallis). Nearly all are in unworn winter pelage, the summer pelage being imperfectly known. Under the name of "forest chipmunk," Bailey has described its habits and range in the Glacier Park region.[1]

[1] Bailey, Vernon, Wild Animals of Glacier National Park, 1918, p. 42.

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PROCEEDINGS
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ANURAPHIS LONGICAUDA, A NEW APHID INJURIOUS TO PLUM TREES.

BY A. C. BAKER.

For several years past an undescribed species of Aphid has occurred in injurious numbers upon the plum trees at Vienna, Va. This species has also been found in Ashland, Neb., by T. A. Williams and in House Springs, Mo., by H. Grubar. It attacks both the twigs and the leaves and the twigs attacked by the species are in nearly every case dead the following year. Insects are found either upon the twigs or the foliage throughout the summer and the apterous sexes are met with upon the twigs where the eggs are laid in the fall. While the spring forms are usually a dark brown, many of the summer forms are pale yellowish white and these forms are most often seen on the under sides of the leaves.

STEM-MOTHER.[1]

The stem-mothers hatch about the first of April. In 1916 some of the young stem-mothers were noted on April 2nd while many of the eggs had not yet hatched. On April 8th a heavy fall of snow occurred with freezing weather and many of the stem-mothers were killed. They had not advanced during this time past the first instar.

Some of the remaining stem-mothers which were in the first instar on April 7th were placed in sheltered experiments. These moulted first from the 12th to the 14th. The other moults varied considerably but some of the stem-mothers were adult and reproducing by April 24th. Others were not reproducing until May 1st.

Length, 1.68 mm.; width of abdomen, 1.2 mm. Antennae as follows: Segment I, 0.048 mm, II, 0.048 mm., III, 0.336 mm., IV, 0.144 mm., V

[1] Type locality, Vienna, Va. Cotype slides in U. S. Nat. Mus. Coll. of Aphididae, taken by the writer; Stem-mothers, April 17, 1913; alate forms, May 5, 1913; apterous forms, May 15, 1913.

(0.108 mm. + 0.112 mm.). Segments distinctly imbricated but without secondary sensoria. Cornicles 0.24 mm. long and very distinctly imbricated, no distal flange present. Cauda about 0.128 mm.

Color brown with the appendages black or very dark. Abdomen with small black lateral spots which become large patches toward the thorax. Caudad of the cornicles a large black patch is present which more or less connects with a transverse black area on the caudal abdominal segments.

TABLE OF MEASUREMENTS OF STEM-MOTHERS.

Ant. III.	Ant. IV.	Ant. V base.	Ant. V unguis.	Cornicle.
0.336	0.16	0.112	0.112	0.224
0.32	0.112	0.112	0.112	0.24
0.336	0.128	0.08	0.048	0.24
0.32	0.128	0.112	0.096	...
0.32	0.128	0.096	0.08	0.208
0.336	0.128	0.096	0.08	0.224
0.368	0.16	0.096	0.064	0.208
0.336	0.144	0.096	0.096	0.24
0.336	0.144	0.112	0.112	0.208
0.352	0.16	0.112	0.096	0.224

APTEROUS VIVIPAROUS FEMALE.

Apterous forms occur throughout the summer in all generations. They vary considerably in color from a brown to a pale yellowish white. The first generation after the stem-mother matures about the second week in May.

Color brown or cream, some specimens apparently being all of the one color and other specimens distinctly the other color. Legs and appendages dusky or black. Black markings somewhat similar to those of the stem-mother though not so prominently indicated on the sides.

TABLE OF MEASUREMENTS OF APTEROUS FORM.

Ant. III.	Ant. IV.	Ant. V.	Ant. VI base.	Ant. VI unguis.	Cornicle.
0.304	0.224	0.176	0.112	0.16	0.336
0.32	0.208	0.144	0.096	0.144	0.32
0.304	0.192	0.16	0.112	0.16	0.32

Length from vertex to tip of cauda, 1.76 mm. Width of abdomen, 1.04 mm. Antennae with the following measurements: Segment I, 0.064

mm., II, 0.048 mm., III, 0.304 mm., IV, 0.224 mm., V, 0.192 mm., VI (0.112 mm. + 0.16 mm.). Segments imbricated but no secondary sensoria present. Cornicles 0.32 mm. long, subcylindrical, slightly tapering, distinctly imbricated and without a distal flange. Cauda, 0.112. Three pairs of very prominent lateral tubercles are present, one pair on the prothorax, one pair between the middle and hind coxae and one pair caudad of the cornicles.

Alate Viviparous Female.

Winged forms begin to appear with the first generation after the stem-mother and may be found thereafter throughout the season. Pupae of the first generation of winged forms are present during the first week in May, while the apterous forms of the same generation are just beginning to reproduce.

Color brownish. Head, thorax and appendages black. Abdomen pale brown with 5 rather large black patches on each wide. Caudad of the cornicles three transverse bands of black are present which become more or less fused. Cornicles sometimes with the extreme tip pale. Wing veins heavy and margined with brown.

Length from vertex to tip of cauda, 2 mm. Antennae as follows: Seg. I, 0.048 mm., II, 0.408 mm., III, 0.24 mm., imbricated and armed with 5 or 6 subcircular sensoria forming an even row, IV, 0.208 mm., imbricated but without secondary sensoria, V, 0.192 mm., similarly imbricated but lacking secondary sensoria, VI (0.144 mm. + 0.176 mm.). Forewings, 2.3 mm. long and 0.96 mm. wide at their widest diameter. Hind wings, 1.52 mm. long. Wing veins heavy. Cornicles, 0.272 mm. long, subcylindrical and prominently imbricated. The distal extremity has no distinct flange but is cut off squarely or rounded. Cauda about 1.28 mm. long.

Table of Measurements of Alate Form.

Ant. III.	Ant. IV.	Ant. V.	Ant. VI base.	Ant. VI unguis.	Cornicle.
0.272	0.192	0.176	0.128	0.16	0.256
0.192	0.176	0.16	0.112	0.16	0.24
0.256	0.16	0.176	0.128	0.16	0.224
0.192	0.176	0.176	0.128	0.176	0.24
0.256	0.176	0.16	0.128	0.16	0.24
0.24	0.176	0.176	0.096	0.144	0.24
0.288	0.208	0.192	0.144	0.176	0.256
0.32	0.208	0.176	0.128	0.192	0.272
0.288	0.208	0.192	0.128	0.16	0.272
0.288	0.176	0.176	0.128	0.192	0.272

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A NEW LEPTODESMOID DIPLOPOD FROM LOUISIANA.

BY RALPH V. CHAMBERLIN.

The new diplopod here described is represented in a collection of Myriopods made in and near New Orleans by Mr. H. Edward Hubert, by whom it was transmitted to me for identification. Other diplopods occurring in the material are *Polydesmus serratus* Say, *Callipus lactarius* (Say), *Paraulus impressus* (Say), amd *Spirobolus marginatus* (Say). The chilopods occurring are *Scutigera forceps* (Raf.), *Neolithobius transmarinus* (Koch), *Scolopendra viridis* Say, *Hemiscolopendra punctiventris* (Newport), *Theatops posticus* (Say), *Arenophilus bipuncticeps* (Wood) and *Linotaenia fulva* (Sager).

In addition to the genus here described, two other unnamed genera of leptodesmids occur in the eastern part of the United States, these being characterized primarily by types of structure in the male gonopods different from those of the one discussed below and of the western North American genera. The first of these may be designated **Semionellus,** with *Leptodesmus placidus* Wood as the genotype. The second may bear the name **Dicellarius,** with *Leptodesmus okefenokensis* Chamberlin the genotype.

Eurymerodesmus, Biölemann.

Antennae filiform; joints two to five subequal, the sixth scarcely longer; the normal four sensory cones.

Collum of usual proportions, as wide as the second tergite or but little narrower.

All tergites wholly smooth; keels but moderately extended; margins thickened, entire, smooth; anterior angles rounded, the posterior from

rounded to subrectangular excepting in posterior segments where moderately produced. Pores distinctly lateral, present on segments 5, 7, 9, 10, 12, 13, 15–19.

Distinguished especially by the form of the gonopods in the male. These comparatively small and in considerable part concealed. The salient feature is that the telopodite presents only a single, unbranched, slender blade arising from a robust proximal division. In the known species long setae occur along the ectal side of the gonopods, sometimes continuing upon the blade, and there is at the distal end of the proximal division a separate series of stout setae.

Genotype.—*Paradesmus hispidipes*, Wood.

In addition to the genotype, *E. simplex*, sp. nov. also belongs in this genus.

Eurymerodesmus simplex, sp. nov.

This is a smaller and paler species than *E. hispidipes* (Wood), a form common in some parts of Louisiana and ranging northward to Illinois. The color of the types is fulvous throughout, the dorsum very slightly darkened with the carinæ a little paler, without definite median line or other markings.

Tergites well arched, smooth throughout.

Head smooth. Vertigial sulcus deep, ending near upper level of antennal sockets. Antennae filiform, the ultimate article alone narrowed; when bent back reaching upon the third tergite.

Collum strongly bowed forward, the median region of margin more flattened. Posterior margin at middle straight or weakly incurved, laterally bending cephalad of ectad. Lateral ends narrowly rounded.

In the succeeding tergites the anterior corners of the keels are all well rounded. In the most anterior tergites the caudal margins of the keels run obliquely out forward of ectad, becoming more and more nearly transverse in going caudad, the posterior finally becoming produced usually beginning with the thirteenth or fourteenth tergite, the processes becoming thereafter more and more pronounced to the nineteenth. The lateral margin of keels as seen from above smooth and moderately convex. Last tergite subtriangular, sides a little incurving, tip narrowly truncate, scarcely depressed. Valves with mesal borders thickened, submarginate. Anal scale subtriangular in general outline, but the anterior margin curving caudad at ends and the apex or caudal angle rounded.

Conical processes between coxae of second legs of sixth segment apically bending caudad. The similar processes between coxæ of legs of seventh segment bending forewards against gonopods or near to them.

Gonopods of the male with the thickened proximal division elongate, moderately clavately thickening distad. Blade short, in length not much exceeding greatest thickness of basal division and equalled or exceeded by the length of the distal setæ; arising at ectal edge of base, distally curved a little ectad, slender.

Length, to near 24 mm.; width, 3.8 mm. 4 mm.

Four specimens taken at New Orleans in 1918.

Readily separable from *E. hispidipes* (Wood) in the characters of the gonopods, the basal division being much longer, the distal blade shorter and wholly glabrous instead of bearing hairs throughout as does *hispidipes*.

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A NEW DIPLOPOD OF THE GENUS ATOPETHOLUS.

BY RALPH V. CHAMBERLIN.

A series of specimens recently sent for identification from the National Museum prove to represent an undescribed species of the Spiroboloid genus *Atopetholus*, proposed by the writer in these Proceedings for Dec., 1918 (Vol. 31, p. 167), the present one making the fourth known species. The types of the new species were collected by Gordon Grant on Dec. 30–31 at Los Angeles in Edendale suburb (Silver Lake) and on Bishop's Road.

Atopetholus angelus, sp. nov.

Clearly distinct from the previously known species in the structure of the gonopods of the male. As compared with those of the genotype, *A. californicus*, the caudal or reflexed limb of the median plate of the anterior gonopods is narrower; ventral end of plate either evenly rounded or weakly indented. Posterior apophysis of telopodite of anterior gonopods in ventral view longer and more slender, not expanded distally; the distomesial angle of telopodite more prominent, often meeting its mate in the middle line. Telopodite of posterior gonopods distally more strongly uncate than in *californicus* or *fraternus;* a small point or mucron from bentral side of base of hook. General color typically shining black with a narrow, typically ferruginous but sometimes nearly white, pale line along caudal border of each segment, the collum having an anterior ferruginous border as well. Legs from dark brown to fuscous or black. Sulcus of head widely interrupted in the upper frontal region, elsewhere deep, especially in clypeal region. Clypeal foveolae 5 + 5, the most ectal one on each side separated by a wider space than the others. Collum narrow on each side below as usual, extending freely below level of second tergite farther than in the other species; tip on each side bent slightly caudad so that the caudal margin just above the end appears weakly concave; anterior margin incurved opposite cardo, forming a prominent obtuse

angle at level of lower edge of eye; broadly margined on each side up to level of eye, the margining sulcus above typically bending in caudad of dorsad; surface under the lens showing very fine punctæ, extended in weak, fine and very short lines in part. Sculpturing of other segments typical, the striations below and across prozonites being as usual. Segmental suture in the encircling furrow of each segment; pore at anterior edge of furrow, the suture bending toward it, often angularly. Anal valves exceeding the last tergite, strongly convex, evenly rounded, the mesial borders depressed, not at all set off. First two pairs of legs of male crassate, the claws large as usual, those of succeeding pairs decreasing to the eighth, those of legs following the gonopods smaller. Coxæ of legs from third to eighth with the usal conical processes, these strongly compressed in the anterocaudal direction excepting those of the third pair, these being somewhat thicker and having their apices depressed or flattened. First two pairs of legs in female also more or less thickened with claws long.

Number of segments, thirty-nine to forty-two.

Length, to 50 mm.; thickness, to 6 mm.

Types in the Collections of the U. S. National Museum.

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SOME NEW PLANTS FROM THE PACIFIC NORTHWEST.

BY C. V. PIPER.

In various collections of plants sent to the writer recently from Oregon, Washington and British Columbia, there were found several species not heretofore described. Some of these seem to be very local as they have not been found by other collectors. Most of them are from rather high Alpine localities. The type specimens are in the possession of the writer, unless otherwise indicated.

Erysimum torulosum, n. sp.

Biennial, with a stout taproot; stems erect, usually simple, solitary, 15–45 cm. high; herbage green, sparsely strigillose throughout with short forked hairs; basal leaves spatulate, acute, coarsely dentate to subentire, 3–8 cm. long; cauline similar but reduced, mostly entire; sepals lanceolate acutish, green at first, 7 mm. long; petals yellow, 1.5 cm. long; peduncles in fruit, 1 cm. long; pods ascending or spreading, 4-angled, torulose, strigillose, conspicuously beaked, 6–8 cm. long; seeds not margined.

Mount Rainier, Wash., on Owyhigh, alt. 5500 ft. *J. B. Flett*, Aug. 11, 1919; Nos. 3158 (type), 3160; Mt. Rainier, *Piper* 2062; *Allen* 266; Mt. St. Helens, *Coville* 777.

This plant must be segregated from *E. asperum* (Nutt.) DC. on account of its green herbage and very different torulose pods. Perhaps all the specimens from high altitudes in the Cascade and Olympic Mts. are to be referred here, but until the present mature pods seem not to have been collected.

Arabis macella, n. sp.

Biennial from a stout taproot; stems many, simple, slender, flexuous, terete, sparsely pilose below with simple hairs, otherwise glabrous, 40–50 cm. tall; basal leaves spatulate-oblong, obtuse, 3 cm. long, the blade longer than the margined petiole, glabrous on the faces, the margins ciliate with

simple hairs; cauline leaves few, oblong to linear, obtuse to acute, broad but not auriculate at base, ciliate, the lower 2 cm. long, reduced upwards; recemes in fruit 5–15 cm. long; pedicels erect in anthesis, spreading in fruit, 1–1.5 cm. long, glabrous; sepals oblong, obtuse, margined, glabrous, the two outer gibbous at base, 2–2.5 mm. long; petals oblong-spatulate, obtuse, white, 4 mm. long; pods erect, glabrous, somewhat compressed, the valves mostly 3-nerved, the midrib stoutest, 1.5–2 cm. long, 1 mm. wide, tipped with a style 1.5 mm. long; seeds in one row, oval, compressed, wingless, dark brown, 0.5 mm. long; cotyledons accumbent.

Ritzville, Wash., *Sandberg* and *Leiberg* No. 202, June 11, 1893, type in the U. S. National Herbarium sheet No. 289784. An ally of *A. furcata* Wats.

Castilleja brevilobata, n. sp.

Perennial with a deep taproot and branched multicipital caudex; stems clustered, erect or ascending, 10–15 cm. high, puberulent or in the inflorescence pilose; leaves sessile, oblong, obtuse, 3-nerved, hispidulous and somewhat viscid especially on the margins, 1–2 cm. long, entire or mostly with 3 short obtuse lobes; bracts similar to the leaves but broader and more deeply lobed, the tips scarlet; flowers subsessile; racemes rather loose, narrow, 5–10 cm. long; calyx 10 mm. or in fruit 12–13 mm. long, subequally cleft before and behind, just equalling the corolla lip, the lobes each with 2 short obtuse teeth; corolla 15–18 mm. long, the galea 8 mm. long, slender, glandular puberulent on the back especially at tip, the broad margin scarlet; lip green, fleshy, 2 mm. long, the acute teeth incurved; stigma bilobed, small; capsule ovoid, very acute, dark brown, glabrous, 6–8 mm. long.

In reddish soil on mountain slopes, 8 miles south of Waldo, Josephine County, Oregon, June 14, 1904, *C. V. Piper* No. 6118 (sheet 527,720, U. S. National Herbarium *type*) and No. 6230; same locality, *Thomas Howell,* June 8, 1884.

Allied to *C. angustifolia* (Nutt.) Don, but differing in all its parts being smaller, the short-lobed leaves, and the somewhat viscid hispidulous pubescence.

Castilleja chlorotica, n. sp.

Perennial with a stout vertical taproot, several to many stems arising from the crown; stems erect or nearly so, mostly simple, 15–20 cm. high, viscid puberulent; leaves sessile, oblong-lanceolate, obtuse, about 2 cm. long, minutely and very sparsely puberulent, mostly simple but some of the upper ones 3-cleft; flowers subsessile; racemes 3–4 cm. long, at first dense, becoming looser below; bracts all 3-cleft, the middle lobe broadest, acute or obtuse, as long as the flowers; calyx yellowish green, 15 mm. long, minutely puberulent on the tube, hispidulous on the lobes, subequally cleft before and behind into lobes shorter than the tube, each lobe cleft into two broad triangular acute teeth which extend well beyond the corolla lip; corolla 2 cm. long; galea 8 mm. long, hispidulous on the back, greenish except the narrow purple margin; lip 2 mm. long, green, fleshy, the lobes

involute, acute; stigma small, globose; immature pods ovoid, acute, glabrous.

Grayhart Buttes, County, Oregon, alt. 2250 meters, August 8, 1896, *Coville* and *Leiberg* No. 283.

Related to *C. angustifolia* (Nutt.) Don, but distinguished by its viscid puberulence, mostly entire leaves, and peculiarly colored bracts and corolla.

Aster misellus, n. sp.

Perennial from a loosely muchbranched base; stems simple or loosely branched above, terete, sparsely white puberulent, purple, 10–20 cm. high; leaves pale, entire or few-toothed; basal leaves spatulate-oblong, obtuse, glabrous except the ciliolate margins, the blades equalling the petioles; cauline narrowly oblanceolate, obtuse to acute, half-clasping at base, 2–8 cm. long, ciliolate at the base and slightly so on the margins; upper ones reduced; heads few, mostly solitary terminating the branches, each about 1 cm. broad, hemispheric; tegules in two indistinct series, acute to obtusish, the midribs and tips green, broadly scarious-margined, ciliolate, glabrous on the back, shorter than the disk; rays about 20, pale violet 6–8 mm. long; pappus whitish; akenes sparsely hirsutulous.

Moist beach of Strawberry Lake, Strawberry Mts., Grant County, Oregon, *W. C. Cusick*, Nos. 3636 (type), 3623, 3625, September 9, 1910. Closely allied to *A. occidentalis* Nutt.

Achillea eradiata, n. sp.

Perennial with a creeping rootstock; stems about 30 cm. high, corymbosely branched above, sulcate, sparsely villous; leaves green, sparsely villous, the lower ones 5 cm. long, petioled from a broad scarious base, the upper ones 2–3 cm. long, sessile and but slightly broadened at base; lower leaves with 10–15 pairs of divisions, separated by about half their length, most of the divisions deeply 5–10 cleft; upper leaves less deeply divided, the rachis margined, the divisions merely lobed or cleft; inflorescence loose, composed of about 5 corymbiform branches 4–5 cm. long; heads cylindric-turbinate, 5–7 mm. long, 3–4 mm. broad; tegules about 20, elliptic-ovate, sparsely villous, all obtuse, greenish along the midrib, the scarious margins brown; flowers 3 mm. long, cream-colored, all tubular, the outer ones slightly larger, an occasional one developing into an imperfect ligule; akenes immature.

Dry border of woods, east end of Pamelia Lake, foot of Mt. Jefferson, Oregon, 4000 ft. alt., Aug. 13, 1919, *J. C. Nelson* No. 2791, one plant only growing with the common *Achillea lanulosa* Nutt., from which it is strikingly divergent. Very different from any other North American species in its very loosely divided leaves, large involucres, and rayless heads.

Arnica aphanactis, n. sp.

Rootstocks slender, creeping; herbage wholly glabrous except the minutely puberulent peduncles; stems 30 cm. high, somewhat shiny; basal leaves not seen; cauline 2 pairs, elliptic or slightly ovate, paler beneath,

obtuse, coarsely irregularly serrate, 2–5 cm. long, the lower pair short petioled, the upper pair sessile and larger; heads three, long-peduncled from a lanceolate acute dentate sessile green bract; heads campanulate, rayless, 1.5 cm. high, 1 cm. broad; tegules 8, linear-lanceolate, acuminate, shorter than the flowers, glabrous; disk flowers about 25, each 1 cm. long; pappus bright white, barbellulate; akenes cylindric, glabrous.

Mount Baker, Washington, *G. W. Turesson* in 1915. Closely allied to *A. latifolia* Bong. and *A. betonicaefolia* Greene but rayless.

Arnica andersonii, n. sp.

Stems erect, 30–50 cm. high, very sparsely pubescent, simple or more commonly with a flowering branch in the axil of each cauline leaf; basal leaves with petioles as long as the blades, the latter thin, oblong to narrowly ovate, acute, abruptly narrowed at base, coarsely few-toothed, glabrous except the ciliolate margins, 6 to 8 cm. long; cauline leaves two pairs, the lower pair similar to the basal and petiolate, the upper sessile and usually conspicuously contracted at base; heads nodding in bud, large, each subtended at base by a pair of more or less modified leaves; involucre campanulate, 1.5 cm. broad; tegules 10, green, thin, lanceolate, acute, viscidly pubescent, 1.5 cm. long; rays about 10, lemon-yellow, 3 cm. long; disk florets 11–13 mm. long; akenes hirsutulous, 6–8 mm. long; pappus bright white, copious, short-plumose.

Skeena, Br. Col., *J. R. Anderson*, Sept. 11, 1910. Allied to *A. cordifolia* Hook. but differing particularly in the basal leaves and the pair of foliaceous bracts at the base of each head.

Arnica myriadenia, n. sp.

Stems clustered from a much branched caudex, erect, 30–50 cm. high, densely and minutely glandular, becoming increasingly hirsutulous toward the heads; basal leaves apparently none; cauline leaves 4 or 5 pairs with green blades and 2 or 3 basal pairs much reduced and more or less scarious, all sessile and connate at base, the lower ones conspicuously sheathing, lanceolate becoming narrower upwards, acute, entire or sparingly denticulate, densely and minutely glandular on both faces and somewhat puberulent especially on the margins, 4-12 cm. long, exceeding the internodes; heads 3 to 5, hemispheric, 2 cm. broad, short peduncled; tegules about 11, lanceolate, acuminate, green, densely glandular and somewhat puberulent, equalling the disk flowers; rays bright yellow, 1.5 cm. long; disk flowers 40–60; pappus brownish, barbellulate; akenes sparsely hispidulous, not glandular; plant strongly odorous.

Mount Rainier National Park, Washington, growing in talus on Owyhigh, 5700 feet altitude, *J. B. Flett* No. 3211, August 13, 1919. The plant was found in no other place.

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FIVE NEW SPECIES OF CEDRELA.

BY S. F. BLAKE.

Recent study of the material of Spanish cedar (*Cedrela*) in the United States National Herbarium, in connection with the determination of a species of the genus from Guatemala which will be described in another connection, has led to the detection of five apparently new members of the genus from Mexico, Central America, and South America. In Casimir DeCandolle's original treatment of this genus in 1878[1] nine species were recognized from America in addition to two doubtful ones and one (*C. alternifolia* (Mill.) Steud.) which was considered as probably to be excluded from the family. Numerous species have since been described, chiefly by DeCandolle, the recognized authority on the family, and in a key to the American species given by him[2] in 1907 twenty-five species are recognized. Adding to these *C. saxatilis* Rose, omitted from DeCandolle's key, and the species since described, the total number of species of *Cedrela* now recognized from America, including the five here first published, is brought to 34.

As is well known, the wood of many species of *Cedrela* is of much economic importance, being very permanent, easy to work, and having an agreeable odor. It is much used for the manufacture of moth-proof chests, furniture, and cigar boxes, and in the regions where it is native it is used for shingles, canoes, and other articles which have to withstand the weather.

[1] Mon. Phan. **1**: 735. 1878.
[2] Ann. Cons. Jard. Genève **10**: 168. 1907.

Cedrela discolor Blake, sp. nov.

Tree; branches stout, lenticellate, fuscous or grayish, essentially glabrous; leaves alternate, abruptly pinnate, with 8 pairs of leaflets; petiole stout, 9 cm. long, subterete, sulcate above, glabrous; rachis similar, 32 to 37 cm. long, obscurely puberulous above between the bases of the leaflets; petiolules obscurely puberulous above, 1 to 4 mm. long; leaflets opposite, the lowest pair ovate, 5.5 to 7.5 cm. long, 3 cm. wide, the second pair similar but larger, 9.5 to 10.5 cm. long, 3.5 cm. wide, the others oblong or elliptic-oblong, 13 to 17 cm. long, 3.5 to 4.3 cm. wide, slightly inequilateral, acuminate and somewhat falcate, rounded-cuneate at base, above deep green, lucid, glabrous, beneath softly and very densely cinereous-pilosulous with curved spreading hairs except on the costa and the chief veins, the costa and the 18 to 20 pairs of lateral veins yellowish white and prominent beneath, the costa impressed above, the lateral veins prominulous, the secondaries and tertiaries prominulous-reticulate both sides; panicle axillary, ovoid, branched from the base, 29 cm. long, 13.5 cm. wide, the branches densely floriferous from near the base, only the ultimate branches sordid-puberulous; cymules crowded, about 7-flowered; pedicels 1 mm. long or less; calyx cup-shaped, 1.8 mm. high, loosely sordid-puberulous, 5-toothed for about half its length, the teeth deltoid, acute; corolla densely rufidulous-pilosulous outside with matted hairs, more sparsely pilose within, 9 mm. long; petals 4 or 5, 2 exterior and 2 interior, or quincuncial, oblong; stamens 4 or 5, glabrous; filaments subulate, 4.5 mm. long; anthers oval, emarginate, 1.5 mm. long; pistil and column 8.5 mm. long; ovary ovoid, glabrous, 2 mm. long, 5-celled; style slender, 3.5 mm. long, glabrous.

Type in the U. S. National Herbarium, no. 571205, collected at San Ramón, Durango, Mexico, April 21 to May 18, 1906, by Edward Palmer (no. 184).

This handsome species may be easily recognized by its very densely flowered panicles of medium-sized rufidulous flowers and its large leaves, deep green and shining above and densely cinereous-pilosulous beneath. It appears to be nearest *C. saxatilis* Rose.

Cedrela rosei Blake, sp. nov.

Tree; branchlet fuscous, angled, finely spreading-puberulous with sordid curved hairs; leaves abruptly pinnate, with 13 pairs of leaflets; petiole stout, densely sordid-puberulous with curved hairs, 10 cm. long, the rachis similar, sulcate, 52 cm. long; petiolules sordidly tomentose-pilosulous, 3 to 4 mm. long; leaflets opposite below, those of the upper pairs about 1.5 cm. apart, the lowest one or two pairs ovate, 5.5 to 8 cm. long, the others oblong or slightly ovate-oblong, 10.5 to 15.5 cm. long, 3.5 to 4.5 cm. wide, slightly inequilateral, short-acuminate, at base subequal and slightly cordate or broadly rounded, coriaceous, above deep green, shining, persistently pilosulous and sparsely glandular along costa, sometimes so along some of the lateral veins, otherwise glabrate, ciliolate, beneath dull green, densely sordid-pilosulous along costa and lateral veins, tufted in the

axils, evenly but not densely spreading-pilosulous along the secondary and tertiary veins and veinlets, the lateral veins 13 to 20 pairs, prominulous on both sides, the secondaries prominulous beneath, less so above; panicle (imperfect) sordid-pilosulous, the axis zigzag, angled, the branches densely floriferous from the middle; cymules about 3-flowered; pedicels mostly less than 1 mm. long; calyx 2 mm. long, 5-lobed to middle, loosely and sordidly tomentose-pilosulous especially toward margin, the lobes imbricated at base, suborbicular-ovate or deltoid-ovate, obtuse to acute, thick-herbaceous with thinner paler margins; corolla in bud ovoid-oval, blunt, thick, 6 mm. long, densely pilosulous-tomentose, griseous, along the edges of the petals rufidulous; petals 5 (two exterior, two interior, one with one margin exterior), oblong-oval, obtuse, pubescent within; column in bud slightly shorter than pistil; stamens 5, glabrous, the subulate filaments in bud 1.8 mm. long, the oval apiculate anthers 1.2 mm. long; ovary subglobose, glabrous, 2 mm. long in bud, the thick glabrous style 1.2 mm. long.

Type in the U. S. National Herbarium, No. 1023058, collected in the vicinity of Quito, Ecuador, October 26 to November 1, 1918, by J. N. Rose and G. Rose (No. 23571).

Cedrela rosei is related to *C. bogotensis* Tr. & Pl., of Colombia, but may be distinguished by its puberulous branches, its larger leaflets, and its thicker calyx. When the mature flowers are known they will doubtless prove to be much larger, as the petals of *C. bogotensis* are said to be only 6 mm. long, while the buds of *C. rosei* are of the same length.

Cedrela rotunda Blake, sp. nov.

Tree; branchlets gray-green, striate, spreading-puberulous, glabrescent; leaves abruptly pinnate, with 2 to 4 pairs of leaflets; petiole subterete, spreading-puberulous, 2.3 to 6.5 cm. long; rachis similar, striate above, 4 to 12.5 cm. long; leaflets subopposite, on densely spreading-puberulous petiolules 3 to 4 mm. long, the blades broadly oval to orbicular, the lower 4 cm. long, 3 cm. wide, the upper 6.5 to 11 cm. long, 4.5 to 9 cm. wide, subequilateral, broadly rounded at each end or obtuse, sometimes emarginulate, papyraceous, above light green, slightly lucid, rather sparsely spreading-puberulous, glabrescent, beneath densely and softly griseous-pilosulous with incurved hairs, the costa and the 4 to 6 pairs of chief veins whitish and prominulous beneath, the costa impressed above and the veins somewhat prominulous, the secondaries slightly prominulous above, obscure beneath; fruiting panicle loose, pyramidal, glabrescent, about 25 cm. long and 18 cm. wide; fruiting pedicels stout, 8 mm. long; fruit oval, obtuse, 2.5 cm. long, 1.4 cm. wide, fuscous, pustulate, dehiscing from the apex, 5-celled; seeds obovate, 1.4 to 1.6 cm. long, 5 to 6 mm. wide, chestnut-brown.

Type in the U. S. National Herbarium, No. 636749, collected in the vicinity of Villa Union, Sinaloa, Mexico, April 12, 1910, by J. N. Rose, P. C. Standley, and P. G. Russell (No. 13907).

Owing to the lack of flowers the place of this species is uncertain. It may be recognized readily by its oval or orbicular subequilateral leaflets which are densely griseous-pilosulous beneath.

Cedrela whitfordii Blake, sp. nov.

Tree; branchlet fuscous-brown, stout, sparsely spreading-puberulous and strigose; leaf abruptly pinnate, with 9 pairs of leaflets; petiole terete, 4 cm. long, densely spreading-pilosulous; rachis similar, 36 cm. long, sulcate above; leaflets of the pairs about 1 cm. apart below, subopposite above, on densely puberulous petioles 1 mm. long or less, the lowest ones obliquely ovate-oblong, 8 cm. long, 3.5 cm. wide, the others gradually larger, the sixth and seventh pairs largest, elliptic-oblong, 13.5 cm. long, 5 cm. wide, inequilateral, obtuse, very unequal at base, broadly rounded and overlapping the rachis on the upper side, obliquely cuneate-rounded on the lower, subcoriaceous-pergamentaceous, above deep green, shining, curved-puberulous along costa, ciliolate, beneath duller green, rather densely spreading-pilosulous along the costa and chief veins, spreading-puberulous along all the finer veinlets, barbatulate in the axils, the costa and the 13 to 15 pairs of chief lateral veins prominent beneath, prominulous above, the secondaries and tertiaries prominulous-reticulate on both sides; panicle large, loose, 25 cm. long or perhaps much more, about 50 cm. wide, sordidly spreading-pilosulous on the widely spreading branches, the axis glabrescent; cymules 3-flowered; pedicels 1 to 2 mm. long; calyx 3 mm. long, cup-shaped, cinerascent-puberulous with appressed hairs, 5-toothed, the teeth semicircular, broadly rounded or apiculate, about 0.7 mm. high; corolla densely rufidulous-pilosulous with matted hairs, 8.5 to 9 mm. long; petals 4 or 5, linear-oblong, obtuse; stamens 4 or 5, glabrous, the subulate filaments 2 mm. long, the quadrate-oval anthers 1.2 mm. long, notched at apex and minutely apiculate in the notch; column 5 mm. long; pistil 2.8 mm. long; ovary glabrous, 1 mm. long; style stout, glabrous, 1.2 mm. long; stigma thick, discoid; fruit 4 cm. long; seeds obovate-elliptic, acute or acuminate at each end, 2.2 cm. long, 6.5 mm. wide, chestnut-brown.

Type in the U. S. National Herbarium, no. 1037001, collected near Buena Vista, in the Magdalena and Negro Rivers bottom, Colombia, July, 1917, by H. N. Whitford and J. Pinzon (no. 7).

Cedrela whitfordii is related to *C. bogotensis* Tr. & Pl. and *C. fissilis* Vell. From the former it may be separated by its considerably larger obtuse leaflets on very obscure petiolules, and its much larger corolla; from the latter by its not velutinous branches, its blunt leaflets, the lower of which are alternate, its blunt calyx teeth, and its larger fruit. It bears the vernacular name "cedro real."

Cedrela yucatana Blake, sp. nov.

Tree about 12 meters high; branchlets stout, gray, striate, glabrous; leaves alternate, abruptly pinnate, with 4 to 11 (usually 6 to 8) pairs of leaflets; petioles densely incurved- or spreading-puberulous, glabrate, 4 to 8 cm. long; rachis similar, sulcate above, 8 to 37.5 cm. long; leaflets

opposite or subopposite, the petiolules spreading-puberulous, sometimes glabrescent, 5 to 10 mm. long; blades of the lowest one or two pairs of leaflets ovate or oval-ovate, 3.5 to 7 cm. long, 2.5 to 3.5 cm. wide, inequilateral, acute, broadly rounded at base, of the other leaflets oblong-elliptic to lance-oblong, 6.5 to 13 cm. long, 2 to 4 cm. wide, rather abruptly acuminate to an acutish apex and slightly falcate, at base unequal, obliquely cuneate or rounded-cuneate on the lower side, broadly rounded or subcordate on the upper, pergamentaceous, above grayish green, at maturity incurved-puberulous on costa or glabrate, beneath evenly spreading-puberulous over whole surface or only along the veins, the costa and the 9 to 16 pairs of lateral veins flattish or usually impressed above, prominent beneath, the secondaries prominulous-reticulate beneath; panicle pyramidal, loose, branched essentially from the base, about 16 cm. long and wide, spreading branches branched from near the middle, the ultimate branchlets finely puberulous; cymules about 3-flowered; pedicels 1 to 2 mm. long; calyx cup-shaped, 1.5 to 2 mm. high, rather sparsely and finely puberulous, 5-toothed for about $^1/_3$ its length, the teeth triangular, acute; corolla densely griseous-pilosulous outside with matted hairs, pilose within, 8 to 9 mm. long; petals, 5, quincuncial, linear-oblong, 1.8 to 2 mm. wide; stamens 5, the slender filaments sparsely pilose, 2 mm. long, the blunt quadrate anthers 0.7 mm. long; column much longer than ovary and style; ovary subglobose, glabrous, 0.7 mm. long; style glabrous, 2.5 mm. long; fruit oblong-oval, 3.5 cm. long, 1.8 cm. thick, obtuse, fuscous, lenticellate; seeds elliptic or elliptic-oblanceolate, chestnut-brown, 2 to 3 cm. long, 6 mm. wide.

Type in the U. S. National Herbarium, no. 15618, collected at Mérida, Yucatan, Mexico, by A. Schott (no. 199).

Other Specimens Examined:

Veracruz: Carrizal, May 12–14, 1901, *Goldman* 711.

Campeche: Apazote, near Yohaltun, December 30, 1900, *Goldman* 505.

Yucatan: Vicinity of Mérida, December 26, 1912, *Collins* 3.

Cedrela yucatana seems to be nearest to *C. occidentalis* C. DC. & Rose, of western Mexico, but may be distinguished by its larger flowers, pilose filaments, and long style.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW SALVIAS FROM GUATEMALA.

BY S. F. BLAKE.

About a year ago the writer described in these Proceedings[1] a new Salvia with handsome blue flowers from Guatemala, collected by Wilson Popenoe of the Office of Seed and Plant Introduction. This species is now being grown for distribution at the Introduction Farm at Yarrow, Maryland, and promises to be an attractive addition to the cultivated Salvias. Mr. Popenoe has recently sent for determination another new Salvia of the Fulgentes group with crimson-scarlet flowers. This is described below as *Salvia popenoei*, and with it another new species of the same group collected in Guatemala several years ago by E. W. D. Holway.

Salvia holwayi Blake, sp. nov.

Herbaceous, probably 1 meter tall or more,the base and lower portion not seen; stem stoutish, brownish, shallowly 4-sulcate, oppositely branched, rather densely hispidulous-puberulous with spreading or reflexed hairs and especially in the grooves hispid-pilose with reflexed to spreading or ascending several-celled hairs, glabrescent below; leaves opposite; petioles slender, 0.8 to 3 cm. long, spreading-puberulous and above hispid-pilose, connected at base by a densely hispid-pilose ring; blades broadly ovate, 4.5 to 8.5 cm. long, 2.8 to 7.5 cm. wide, acuminate, cordate at base, papyraceous, crenate-serrate with blunt depressed teeth, above green, sparsely hispid-puberulous with several-celled ascending hairs, beneath pale green, along the veins and veinlets loosely pilose with lax many-celled hairs; racemes terminating stem and branches, simple, dense, 5.5 to 15.5 cm. long, densely stipitate-glandular and hispid-pilose with several-celled spreading hairs, on a peduncle 1.3 to 6 cm. long; verticels many-flowered, the lowest 1.5 to 2 cm. apart, the others crowded; bracts ovate, quickly deciduous, the uppermost about 4 mm. long; pedicels 4 to 5 mm. long; calyx tubular-

[1] Proc. Biol. Soc. Wash. 32: 187. 1919.

campanulate, in anthesis 9 to 11 mm. long, densely stipitate-glandular and along the veins sparsely hispid-pilose with short several-celled conical mostly eglandular hairs, the upper lip entire, 4 mm. long, its short abrupt acumination about 1 mm. long, the lower lip 2-lobed, 2.5 to 3 mm. long, the lobes deltoid-ovate, abruptly short-pointed; corolla crimson, 2.5 cm. long, pilose toward apex with several-celled hairs, the tube 5 mm. long, the ventricose throat 16 mm. long, the upper lip porrect, 4.5 mm. long, the lower lip rather shorter, spreading, with small lateral lobes; style equalling corolla, short-hispid-pilose toward apex; staminodes clavate-spatulate, 1 mm. long.

Type in the U. S. National Herbarium, no. 862664, collected on the Volcan de Agua, above Santa Maria de Jesus, Guatemala, March 7, 1916, by E. W. D. Holway (no. 579).

Salvia holwayi is a member of the series Fulgentes and most nearly related to *S. adenophora* Fernald, which has the stem and calyx densely pilose with gland-tipped hairs.

Salvia popenoei Blake, sp. nov.

Herb up to 2.6 meters high, apparently little branched, the base not seen; stem quadrangular, 3 mm. thick, glabrous below the inflorescence; leaves opposite, much shorter than the internodes; petioles slender, sparsely puberulous above, 8 to 17 mm. long, connected at base by a hispidulous ring; blades ovate, 5 to 6.5 cm. long, 2.5 to 4 cm. wide, with acuminate entire tip, at base broadly rounded or subcordate, serrate with about 10 pairs of depressed mucronulate teeth, firm-herbaceous, above green or brownish green, glabrous except for sessile glands, beneath much paler green, punctate, glabrous, reticulate-veined, but only the costa and primary nerves prominulous; racemes terminal, simple, on a peduncle 1.8 to 3.2 cm. long, densely stipitate-glandular and sparsely short-hispid-pilose with white gland-tipped one-celled hairs; verticels 1.5 to 2.5 cm. distant, 4 to 10-flowered; bracts deciduous, not seen, those of the lowest whorl sometimes ovate, foliaceous, 12 mm. long; pedicels 4 to 6 mm. long; calyx tubular-campanulate, in anthesis 12 to 15 mm. long, densely stipitate-glandular and sparsely hispid-pilose on the nerves with short conical rarely gland-tipped white hairs, dull green, 15-nerved, the upper lip ascending, about 8 mm. long, entire, attenuate with almost cirrhiform bent tip, the lower lip 2-lobed, about 6 mm. long, the lobes subulate-attenuate from an ovate base; corolla "crimson-scarlet," 2.3 to 2.9 cm. long, glandular-pilose on the upper lip, otherwise glabrous, the tube about 6 mm. long, the ventricose throat about 1.8 cm. long, the upper lip porrect, 5 mm. long, the lower shorter, spreading, with small rounded lateral lobes; style barely exserted, sparsely pilose near apex.

Type in the U. S. National Herbarium, no. 989689, collected along road near Tactic, Alta Verapaz, Guatemala, at an altitude of about 1525 meters, January 9, 1920, by Wilson Popenoe (no. 928).

Closely related to *Salvia puberula* Fernald, of the series Fulgentes, which

has a finely and densely puberulous stem. Its native name in the Kekchi dialect is given by its collector as "tutz unún."

This handsome species will be distributed by the Office of Foreign Seed and Plant Introduction under the No. 49389. Mr. Popenoe considers that it should be tried in the United States as an annual, but that it may prove to be a biennial in Florida and California.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW TREES AND SHRUBS FROM MEXICO AND GUATEMALA.

BY S. F. BLAKE.

The following new species of woody plants from Mexico and Guatemala have been found in the course of recent work in the United States National Herbarium.

Capparis hexandra Blake, sp. nov.

Tree, strictly glabrous throughout; leaves alternate; stipules triangular, corneous, deciduous, 1.5 mm. long; petioles sulcate, 1 to 1.3 cm. long; blades obovate-oval, 5.5 to 6.7 cm. long, 1.8 to 3 cm. wide, obtuse or broadly rounded at apex, apiculate, at base cuneate or rounded-cuneate, coriaceous, entire, at maturity rather pale green both sides and slightly shining above, the costa sulcate above, the lateral veins 5 to 8 pairs, prominulous on both sides, the secondaries obscure or slightly prominulous; flowers solitary in the axils of the upper leaves, "yellow and white, fragrant;" pedicels 18 mm. long; sepals 4, 2-seriate, imbricated, subherbaceous with thin margins, green, rounded, the outer minutely but distinctly apiculate, the inner obscurely so, deciduous, about 11 mm. long and 6 mm. wide, the inner exceeding the outer by about 2 mm.; petals 4, spatulate-oblanceolate, 3.5 cm. long, 9 mm. wide, rounded at apex, the claw somewhat dilated at base; glands 4, ovoid-triangular, 2 mm. high, alternating with the petals and exterior to them; stamens 6, free, the filaments 3.4 cm. long; thecaphore 3.8 cm. long; ovary 2-celled, the ovules in 2 rows of about 10 each in each cell; fruit not known.

Type in the U. S. National Herbarium, no. 989693, collected at Finca Capetillo, near Antigua, Guatemala, at an altitude of 1525 meters, December 4, 1919, by Wilson Popenoe (no. 875).

This plant is of some interest as an addition to the comparatively small number of species of Capparis with a definite number of stamens known from America. It is closely related to *Capparis heydeana* Donn. Sm., also known only from Guatemala, but may easily be distinguished by its much smaller very obtuse leaves and considerably smaller strictly solitary and axillary flowers. The tree from which the type specimen was

collected was found by Mr. Popenoe growing in volcanic loam in a dooryard at Finca Capetillo.

Jatropha sympetala Standl. & Blake, sp. nov.

"Tree with milky sap;" branch stout, subquadrangular, grayish-fuscous, glabrate; young branchlet green, angulate, sparsely ascending-hispidulous; leaves alternate, crowded at base of young branchlet, the blades obovate, 7 to 9 cm. long, 3.5 to 5 cm. wide, strictly entire, obtusely apiculate or emarginulate at the broadly rounded apex, cuneate-narrowed at base, thin, feather-veined with 6 or 7 pairs of scarcely prominulous lateral veins and obscure translucent anastomosing secondaries, punctate, above light green, glabrous, beneath glaucescent and very densely papillose over whole surface; petioles slender, unmargined, 1 to 1.5 cm. long; staminate panicles shorter than leaves, several at base of young growth, densely papillose-hispidulous, the peduncles 3 to 4.5 cm. long, many times dichotomously divided toward apex, the flowers crowded on the ultimate branchlets; pedicels 2 to 3 mm. long; calyx 5-parted nearly to base, 1.2 mm. long, the segments oval, broadly rounded, ciliate and dorsally pubescent; corolla "red," ellipsoid-ovoid, obtuse, 8 mm. long, the 5 lobes oval, rounded, only 1.5 mm. long, densely cinereous-puberulous outside, the tube glabrous; discal glands 5, free, ovoid, dark-colored, 1 mm. long, with narrowed somewhat spreading apex; stamens 10, in two whorls of 5, the 5 shorter with filaments united nearly half their length, the 5 longer 6 mm. long, their filaments united about $^2/_5$ their length; pistillate flowers and fruit unknown.

Type in the U. S. National Herbarium, no. 988581, collected at Playa de Coyula, Oaxaca, Mexico, June 13, 1919, by B. P. Reko (no. 350).

Jatropha sympetala belongs to the subsection Canescentes of the section Mozinna as the genus is divided in Pax's monograph, and is easily distinguished from any species of that section by its obovate not cordate leaves. Its vernacular name is given as "piñoncillo."

Guarea obtusata Blake, sp. nov.

Tree; branchlet with light-colored pustulate-lenticellate bark, strigose and strigillose; leaves abruptly pinnate, the leaflets 2 to 4 pairs; petiole subterete, hispidulous-strigillose, glabrescent, 3.5 to 4 cm. long; rachis similar, grooved above, 5 to 15 cm. long; leaflets opposite, on petiolules 4 mm. long, the upper elliptic-oblong or somewhat obovate-oblong, 14 to 17 cm. long, 4.5 to 7 cm. wide, broadly rounded at apex, cuneate and inequilateral at base, pergamentaceous, entire, equally green both sides, glabrous above, beneath sordid-barbate in the axils of the 6 to 8 pairs of prominent veins, otherwise glabrous, the secondaries and tertiaries prominulous-reticulate; lower leaflets similar but somewhat smaller, about 9 to 11 cm. long; panicles axillary on the wood of the year, 3 to 4.5 cm. long, bifid from the base, hispidulous-strigillose, rather dense; cymules mostly 3-flowered; pedicels stout, 3 to 5 mm. long, essentially glabrous; flowers "white with pink tinge, very fragrant;" calyx saucer-shaped, about 1.5

mm. high, 4 to 5 mm. wide, 4-lobed for half its length or less, the lobes suborbicular or suborbicular-ovate, apiculate, incurved-puberulous toward margin; petals 4 or rarely 5, valvate, oblong, 8.5 mm. long, 3 mm. wide, obtuse or acutish, densely papillose-puberulous outside; staminal tube 7.5 mm. long, equaling the pistil, glabrous; anthers 8, sessile, oblong-oval, blunt, 1.2 mm. long; pistil glabrous; disk 1.5 mm. high, thickened above; ovary ovoid-subglobose, 2 mm. long, 4-celled, the ovules solitary; style 4 mm. long, stout, striate, minutely papillose; stigma discoid, 1.6 mm. wide; fruit brown, subglobose, 2.7 cm. long; seeds chocolate-brown, 1.5 cm. long.

Type in the U. S. National Herbarium, no. 887785, collected at Cafetal Concordia (Cerro Espino), Oaxaca, Mexico, altitude 600 meters, December 24, 1917, by B. P. Reko (no. 3701).

Guarea obtusata belongs to the section Euguræa, and may be distinguished by its round-tipped leaflets and very short panicles.

Russelia obtusata Blake, sp. nov.

Suffrutescent below, with a creeping base, the erect stems about 0.5 meter high, oppositely branched or simple, stout, 5 mm. thick below, pale green, 6 or 8-angled, densely and minutely spreading-puberulous; leaves whorled in threes or fours; petioles slender, densely spreading- or incurved-puberulous, 2 to 4 mm. long; blades oval or somewhat obovate-oval or suborbicular, or the uppermost rarely ovate, 1 to 3 cm. long, 8 to 18 mm. wide, obtuse or rounded, at base broadly rounded to cuneate, crenate-serrate with 4 to 8 pairs of acute or obtuse teeth, papery or pergamentaceous, above deep green, sparsely incurved-hispidulous, beneath paler green, sparsely incurved-hispidulous along the costa and 3 or 4 pairs of prominulous veins, glabrate, impressed-punctate; lower bracts leafy, the upper very small; internodes of inflorescence 1 to 2.5 cm. long; peduncles 3 to 5-flowered, 4 mm. long to almost obsolete, sometimes produced into short 2-jointed branches 1.5 cm. long, bearing flowers at each node; pedicels 1.5 to (fruit) 6 mm. long, densely and finely spreading-puberulent; calyx 2.5 mm. long, 5-parted, the segments oval-ovate or ovate, from obtuse or abruptly short-pointed to acuminate but not subulate-attenuate, not striate, glabrous or slightly hispidulous along midline, thick and herbaceous, with rosy margins; corolla scarlet, 13 to 16 mm. long, glabrous outside, inside pilose with few-celled hairs between the bases of the stamens, pilose along the ventral side within with 1-celled hairs and stipitate-glandular, the upper lip emarginate, the lower equal, its 3 lobes oblate-suborbicular, crenulate, 2 mm. long, 3 mm. wide; staminode 1.3 mm. long; capsule subglobose, about 4 mm. thick, tipped with the persistent style, this about 7 mm. long.

Type in the U. S. National Herbarium, no. 453525, collected near Tehuacan, Puebla, Mexico, August 30 to September 8, 1905, by J. N. Rose, J. H. Painter & J. S. Rose (no. 10026).

Other Specimens Examined:

Puebla: Vicinity of San Luis Tultitlanapa, June, 1908, *Purpus* 3270. Chiltepin, near San Luis Tultitlanapa, April, 1908, *Purpus* 3270*a*.

Oaxaca: Valley of Oaxaca, altitude 1525 to 1615 meters, September 20, 1894, *Nelson* 1293.

Russelia obtusata seems to be most nearly allied to *R. cuneata* Robinson, but that species has a 4-angled glabrous and furfuraceous stem, striate fruiting sepals, and other differences.

Russelia tetraptera Blake, sp. nov.

Frutescent; stem elongate, 4 mm. thick, oppositely branched, gray-green, puberulous and sometimes hispidulous, glabrescent, sharply quadrangular, flat or concave between the angles, the angles with corky-margined wings 1 mm. wide or less, reduced above to mere corky margins; leaves opposite; petioles puberulous, 3 to 7 mm. long; blades ovate, those of the main leaves 2.5 to 6.5 cm. long, 2 to 5 cm. wide, obtuse or acutish, truncate-rounded or slightly cordate at base, thin, crenate-serrate or dentate with rounded or acute teeth, above deep green, sparsely incurved-hispidulous or glabrescent, beneath scarcely paler, sparsely incurved-hispidulous along the 3 or 4 pairs of prominulous veins, and dotted with saucer-shaped glands; cymes axillary, many flowered, spreading-hispidulous with slightly curved hairs, 1.8 to 7 cm. wide, the lower leafy-bracted, the uppermost with reduced bracts, the lower internodes 5 to 7 cm. long; peduncles 2 to 5 mm. long; pedicels 1.5 to (fruit) 5 mm. long; calyx 3 to 3.5 mm. long, the five sepals ovate, green, pale-margined, 1 to 5-ribbed, sparsely hispidulous along costa, narrowed into a usually shorter filiform-subulate tip; corolla scarlet, 11 mm. long, glabrous outside, pubescent inside with 1-celled hairs at base of stamens and along the ventral side, the upper lip emarginate, the lower longer, 3-lobed, the lobes essentially equal, oblong-ovate, rounded, 2 mm. long; staminode present, 0.6 mm. long; capsule subglobose, olive-green, glabrous, 3.5 mm. in diameter, tipped with the persistent style, this 6 mm. long.

Type in the U. S. National Herbarium, no. 305142, collected at Tepic, Territory of Tepic, Mexico, January 5 to February 6, 1892, by Edward Palmer.

Other Specimens Examined:

Tepic: Moist ravine, vicinity of Acaponeta, April 10, 1910, *Rose, Standley & Russell* 14313.

This species may be distinguished readily by its puberulous narrowly 4-winged stem and by the dimensions of its flowers.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW FLORIDIAN SUBSPECIES OF THE GENUS LIGUUS.

BY CHARLES T. SIMPSON.

The following new subspecies of *Liguus* have been collected by the writer in Lower Florida during a residence of twenty-two years in that State.

Liguus solidus crassus, n. subsp.

Shell solid, with about seven somewhat rounded whorls; Columella decidedly truncated or even twisted; columellar area covered with a thick, shining callus. Entire shell ivory white excepting a narrow, faint spiral dark line at the periphery. The outer lip is reinforced within by a strong callus which extends the entire length of it.

The type measures: Length, 48 mm.; diameter, 26 mm.

The type was collected on Watson's Hammock, Big Pine Key, Florida, in 1885. I have a smaller specimen from Key West, possibly adult which measures: Length, 26 mm.; diameter, 17 mm.

The type is in the author's collection.

Liguus solidus lineatus, n. subsp.

Shell large, thin, with somewhat rounded whorls, pale greenish yellow with spiral green lines, those on the base more closely spaced and broader, often with a red-brown line around the periphery. Apex and columellar area pink; no dots at the suture nor longitudinal smears.

The type measures: Length, 66 mm.; diameter, 28 mm.

The type was collected on the north side of Lignumvitae Key, Florida.

This is figured in Pilsbry's "Variation and Zoogeography of Liguus in Florida," Pl. XXXVII, figs. 4*c* and 4*d* as a form of Var. *lignumvitae* but among more than a thousand specimens examined I have always found it distinct.[1]

The type is in the author's collection. Paratypes Cat. No. 339108, U. S. N. M. (3 specimens).

[1] It is also figured in the writer's book, "In Lower Florida Wilds," colored frontispiece, fig. 3 (G. P. Putnam's Sons, New York).

Liguus solidus pseudopictus, n. subsp.

Shell large, thin, with slightly rounded whorls, with a dark sutural band that is continued to the aperture, pale, greenish yellow with longitudinal bluish or purplish smears. Just above the suture is a row of brownish blotches and immediately below it is another, the latter markings smaller.

The type measures: Length, 62 mm.; diameter, 30 mm.

The type was collected near the upper end of Lower Matecumbe Key, Florida.

This resembles *L. solidus pictus* of the lower chain of islands but is larger and somewhat differently colored. The type is in the author's collection.

Paratypes, Cat. No. 339109, U. S. N. M. (1 specimen).

Liguus solidus delicatus, n. subsp.

A small form is found on Lower Matecumbe Key which is somewhat semi-transparent. It has a few faint spiral lines which are solid or broken into dots.

The type was collected on the upper end of Lower Matecumbe Key, Florida. It is in the author's collection.

Liguus crenatus capensis, n. subsp.

Shell elongated, solid, with rather flat whorls, white throughout with narrow, green spiral lines.

The type measures: Length, 58 mm.; diameter, 27 mm.

The type was collected on Northwest Cape Sable, and hammocks nearby.

This subspecies is very close to the typical *crenatus* of Cuba. The type is in the author's collection. Paratypes Cat. No. 339092, U. S. N. M. (2 specimens).

Liguus crenatus vacaensis, n. subsp.

A solid, elongated form which is close to *capensis* but differs by having convex outlines to the spire and fewer revolving green lines.

The type was collected southwest of Conchtown, Key Vaca, Florida, and is in the author's collection. Paratype 339091, U. S. N. M. (1 specimen).

Liguus crenatus eburneus, n. subsp.

Shell rather solid, usually somewhat elongated, pure ivory white throughout, or rarely having a few faint spiral lines back of the basal part of the aperture.

The type measures: Length, 52 mm.; diameter, 26 mm.

The type was collected on Timb's Hammock, Lower Dade County, Florida. It has also been collected on the mainland from Long Key in the Lower Everglades north to Lemon City. The type is in the author's collection. It is figured in "Lower Florida Wilds," frontispiece, fig. 10, Paratype Cat. No. 339093, U. S. N. M.

Liguus crenatus mosieri, n. subsp.

Shell small to medium size, generally rather thin, with moderately rounded whorls, usually pale greenish yellow varying to whitish, and darker on the last whorl. Apex and columellar area pure white, the body of the shell having from few to many narrow green, spiral lines that are wanting at the periphery.

The type was collected at the upper end of Brickell Hammock, Miami, Florida. It is abundant in the great hammock at Miami; north to Arch Creek and south to Paradise Key in the Lower Everglades. It is named for Charles Mosier, an excellent naturalist and collector. The type is in the collection of the author. Paratypes Cat. No. 339104, U. S. N. M. (2 specimens).

Liguus crenatus cingulatus, n. subsp.

Shell rather small, inflated, usually thin, with somewhat rounded whorls, pure white with a broad spiral pale yellow band on the upper part of the whorls and another on the base, with occasionally a few faint spiral lines.

The type measures: Length, 38 mm.; diameter, 20 mm.

The type was collected on Brickell Hammock, Miami, Florida. Others were collected at Timb's Hammock, Miami Hammock, Costello's Hammock, Dade County, Florida, and on Long Island of the Upper Keys. The type is in the author's collection.

Liguus crenatus luteus, n. subsp.

Shell variable in size, rather solid, inflated or elongated; apex and columellar region white, the rest of the surface pale yellow to orange, lighter colored on the earlier whorls, often with a greenish peripheral spiral line and occasionally a few other faint ones.

The type measures: Length, 63 mm.; diameter, 25 mm.

Another specimen measures: Length, 38 mm.; diameter, 18 mm.

The type specimen was collected on Key Vaca, above Conchtown. The type is largely and richly colored. Others come from Long Key in the Lower Everglades north to Dania, Florida, and is abundant. The type is in the collection of the author. Paratypes Cat. No. 339094, U. S. N. M. (2 specimens).

Liguus fasciatus alternatus, n. subsp.

Shell in almost every way like that of *castaneozonatus* except that the two broad spiral supra-peripheral and basal dark bands are broken into longitudinal bars of alternately light and dark brown, and the columellar area is rich red. This form may or may not have the narrow peripheral line as does *castaneozonatus.*

The type measures: Length, 45 mm.; diameter, 24 mm.

The type was collected on Timb's Hammock, Florida. Other specimens came from Shiel's Hammock, Lower Dade County, Florida. The type is in the author's collection. Paratype Cat. No. 339099, U. S. N. M. (1 specimen).

Probably a variation from *castaneozonatus* but among the 40 or 50 specimens I have seen there are no intermediates. It is figured in "In Lower Florida Wilds" frontispiece, fig. 8.

Liguus fasciatus ornatus, n. subsp.

Shell solid, with moderately rounded whorls, with reddish or purple apex and pink to deep violet columellar area, the surface yellow, orange or orange-brown becoming more richly colored on the last whorl. Quite often there are one to several greenish spiral lines on the last two whorls.

The type measures: Length, 46 mm.; diameter, 26 mm.

The type was collected on Paradise Key; it also comes from Long Key in the Everglades north to Miami. The type is in the author's collection. It is figured in "Lower Florida Wilds," frontispiece, fig. 11. Paratypes Cat. No. 339100, U. S. N. M. (2 specimens).

Liguus fasciatus miamiensis, n. subsp.

Shell rather small, subsolid, with moderately rounded whorls; apex and columellar area pink to deep violet; body of shell dull whitish; fourth, fifth and sixth whorls having a rather wide median band consisting of irregular brown blotches and zigzags. This pattern changes into narrow greenish lines which continue to the aperture. In some shells there is a narrow, reddish peripheral line.

The type measures: Length, 46 mm.; diameter, 23 mm.

Another specimen measures: Length, 38 mm.; diameter 30 mm.

The type was collected on Miami Hammock, and others northward to Ojus. The type is in the collection of the author. Paratypes Cat. No. 339098, U. S. N. M. (2 specimens).

Liguus fasciatus livingstoni, n. subsp.

Shell small to medium size, rather solid, with slightly rounded whorls; apex and columellar area pink to violet; the rest of the surface yellowish white or greenish white, with few to many green, bronzy or brownish spiral lines; there are sometimes a few faint brown blotches on the fourth to the sixth whorls.

The type measures: Length, 42 mm.; diameter, 22 mm.

Another specimen measures: Length, 45 mm.; diameter, 24 mm.

The type was collected at the north end of Brickell Hammock, and is named in honor of A. R. Livingston, who has been an indefatigable collector of Florida Liguus in almost inaccessible regions. The type is in the author's collection. Paratypes Cat. No. 339102, U. S. N. M. (2 specimens).

Liguus fasciatus elegans, n. subsp.

Shell usually rather small, subsolid, with decidedly flat whorls, with deep pink apex and columellar area. Surface of shell flesh colored or pale pinkish, with a few faint brownish blotches on the third, fourth and fifth whorls. There is a single brownish spiral line at the suture which is carried around the body whorl to the aperture and often a few faint spiral greenish lines on the last whorl.

The type measures: Length, 40 mm.; diameter, 22 mm.

The type was collected on a small island near Whitewater Bay. This beautiful form inhabits exclusively this small island hammock in the Lower Everglades a few miles east of Whitewater Bay. It rarely occurs in hammocks as far north as Arch Creek. One specimen obtained in a small hammock on Long Key in the Everglades is a giant, measuring 60 mm. in length and 32 mm. in diameter. I collected Liguus at Cabanas Bay in Cuba which are almost absolutely identical with this. It is figured in "Lower Florida Wilds," frontispiece, fig. 5. The type is in the author's collection. Paratype Cat. No. 339097, U. S. N. M. (1 specimen).

Liguus fasciatus lineolatus, n. subsp.

Shell subsolid, with somewhat rounded whorls, with rich pink apex and columellar area; general surface of the shell pale pinkish or flesh color, often tinted with pale ochraceous towards the aperture. There are generally a few faint greenish or brownish spiral lines on the last whorl and in many specimens there is a deep buff or pinkish peripheral line.

The type measures: Length, 65 mm.; diameter, 32 mm.

Another specimen from Pumpkin Key measures: Length, 45 mm.; diameter, 22 mm.

The type was collected on Totten's Key; other specimens came from Cape Romano region; Chokoloskee; East Cape Sable; South shore of the mainland; Miami Hammock; Upper Keys. It is figured in "Lower Florida Wilds," frontispiece, fig. 2.

Dr. Pilsbry figured two forms in his paper in the Journal of the Academy of Sciences of Philadelphia under the name *roseatus* but designates the first three figures on Plate XXXVIII as the types. These all have a broad spiral band on the upper part of the body whorl and differ considerably, especially figure 11B, from the figure 18 which I refer to *lineolatus*. Both forms are widely distributed and are somewhat variable but each occurs in several localities where the other is not found. The broad yellow banded form occupies exclusively an Everglade Island hammock not very far from Whitewater Bay while the *lineolatus* is very abundant on Pumpkin Key and is the only form found on the island. The type is in the author's collection. The Museum specimens came from Chokoloskee Cat. No. 339105, U. S. N. M., and were presented by the author.

Liguus fasciatus versicolor, n. subsp.

Shell rather small, somewhat solid, brilliantly polished, with slightly rounded whorls. The ground color may be bluish green with yellow zigzags and longitudinal markings, or yellow with brown markings of various designs along the suture and at the periphery. In all the shells there is a light peripheral line and it is often bordered with burnt brown. Apex deep pink; columellar area pink to whitish.

The type measures: Length, 40 mm.; diameter, 22 mm.

The type was collected at Big Hammock, Long Key in the Everglades; it also occurs sparingly north to Miami. It is figured in "Lower Florida

Wilds," frontispiece, figure 12. The type is in the collection of the author. It is one of the most beautiful and variable shells in the world. Paratypes Cat. No. 339101, U. S. N. M. (3 specimens).

Liguus fasciatus castaneus, n. subsp.

Shell moderately solid, with slightly convex whorls, varying from rich chestnut to almost black, and marked with longitudinal or zigzag yellow flames. Columellar area tinted purplish; apex purplish or whitish. In all except the darkest shells there is a light band at the periphery.

The type measures: Length, 40 mm.; diameter, 20 mm.

Another specimen from Long Key, Everglades, measures: Length, 46 mm.; diameter, 26 mm.

The type was collected from Cox Hammock, Paradise Keys.

There are intermediates between this form and *testudineus* on the one hand and *versicolor* on the other and all three doubtless are hybrids between *marmoratus* and some form of *fasciatus*. The type is in the collection of the author. Paratypes Cat. No. 339106, U. S. N. M. (1 specimen).

The author has in preparation a monograph of the Floridian Liguus, discussing their origin, migration and colonization in our state, and their general ecology.

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PROCEEDINGS
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A NEW GEOPHIS FROM MEXICO.

BY E. R. DUNN.

Among the snakes brought back from Mexico by Nelson and Goldman is a *Geophis* which I take to be undescribed.

Geophis anocularis, new species.

Type, U. S. National Museum No. 46556; adult ♂; collected in 1894 by Nelson and Goldman.

Type Locality.—Totontepec, Oaxaca, Mexico.

Description of Type.—Scales smooth, without pits, in 17 rows; ventrals 124; anal single; subcaudals 35 pairs; labials 6/6; symphysial in contact with chin-shields; two pairs of chin-shields, the anterior the longer; upper part of rostral not more than half its distance from frontal; four lower labials in contact with anterior chin shields; no oculars, eye bounded by prefrontal, loreal, labials 3, 4 and 5, and parietal; prefrontals very large, in contact with parietals.

The maxillary does not extend forward beyond the palatines, the first tooth is at the level of the suture between the second and third labial.

Uniform brown above, light yellow beneath; first and second row of scales mixed brown and light; underside of tail more or less mottled with brown.

Total length, 287 mm.; tail, 52 mm.

Remarks.—So far as I can see this form has little to do with any described *Geophis*.

Geophis rostralis (Jan) and *Geophis dubius* Bocourt are the only ones described as having the symphysial in contact with the chin-shields, but the present species has less ventrals, four instead of three labials in contact with the anterior chin-shields, no oculars, and a much less produced rostral.

Geophis godmani Boulenger is the only described species having the prefrontals and parietals in contact, but it has more ventrals, 15 scale rows, the first lower labials in contact with each other, a long rostral, a postocular, and three lower labials in contact with the chin-shields.

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PROCEEDINGS
OF THE
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SOME REPTILES AND AMPHIBIANS FROM VIRGINIA, NORTH CAROLINA, TENNESSEE AND ALABAMA.

BY E. R. DUNN.

In the summer of 1919, I collected in the Southern States, for the Museum of Comparative Zoology, the work centering around the mountains. It has seemed worth while to record the localities and to add a few notes on the salamanders. I wish to express my gratitude to the authorities of the Museum of Comparative Zoology and especially to Dr. Thomas Barbour for the opportunity of making this trip.

List of Collecting Localities.

Mt. Vernon, Va.; June 20 and 23; Coastal Plain; heavy, damp woods, swamp and tidal flats; altitude below 100 feet.

Dogue Creek, Va.: June 21; Coastal Plain; the flood plain of a small stream; open meadow land; altitude below 100 feet.

Crozet, Va.: August 28; foot of the Blue Ridge in the interior valley of Albemarle and Nelson Counties, Va.; altitude 700 feet. I include here some specimens taken by my brother, R. A. Dunn, during August and September.

Midway Mills, Nelson Co., Va.: June 26–July 6, Aug. 22 and 24; plateau deeply dissected by the James River and small tributaries; river altitude 350 feet, plateau level 550 to 600 feet.

Manteo, Va.: June 30; same general region as Midway.

White Top Gap, Va., High Southern Blue Ridge: July 9–11; White Top Mt. in the Stone Mountains is 5520 feet. The altitude of the more level country is about 3500 feet, and is apparently the same plateau-like surface as at Linville, and is possibly the Kittattinny peneplain. White Top Mt. is wooded at the base with a chestnut-white oak forest and at the top with a fir forest. In between the two is what is now, and has been for a long time, pasture land.

Abingdon, Va.: July 13; Holston Valley at 2000 feet. Typical Appalachian valley country with narrow ridges and broader valleys alternating.

Linville, N. C.: July 15–22; country generally similar to White Top Gap (see also Dunn, Bull. American Museum of Natural History, Vol. 37, pp. 593–634).

Mt. Sterling, N. C.: July 24–26, Great Smoky Mts. The gap of the Pigeon river forms the northern boundary of the range. Sharp Top or White Rock Mt. is the most northern peak, altitude about 5100 feet; the valley at Mt. Sterling is 1500 feet.

Spring City, Tennessee: July 29–31; in the Appalachian Valley at the foot of the Cumberland escarpment. The Cumberland plateau has here a general level of 1600 feet and Spring City itself is 781 feet.

Chattanooga, Tenn.: Aug. 1–3; I visited Signal Mt. and Lookout Mt., both about 2000 feet high, and on opposite sides of the Tennessee, near Chattanooga.

At the three places where I visited the Cumberland plateau, forest fires had practically spoiled the region for collecting. At Spring City the hills are burnt systematically every fall in order to provide better pasturage for the cattle. The larger trees are not destroyed but the effect on the small fauna and on forest development can be imagined.

Anniston, Ala.: Aug. 6–18; southern end of Appalachian valley, alternating ridges and valleys; a region of much underground drainage and with few and large springs and few running streams. A drought was on at the time I was there. Most of my collecting was done in the limits of Camp McClellan and at 800 feet alt.

Morrisville, Ala.: Aug. 11 and 18. Similar to Anniston, but out in the valley away from the ridge. Alt. 550 feet.

SPECIES.

Triturus viridescens (Rafinesque).

Midway (June 29, July 2), 2 red land forms; Linville (July 15–19), 17 water forms in pond at 3800 feet, 17 land forms at 4200 feet; Spring City (July 29), 1 red land form, 1500 feet.

It may be noteworthy that the newt is comparatively rare in unglaciated upland country and usually found in the red land stage *except* where artificial ponds have been put in as at Linville where the newt is as common in both stages as one finds it in glaciated New England.

Ambystoma maculatum (Shaw).

Mt. Vernon, one adult; Midway, 2 larvæ in a pool of water in an abandoned quarry.

Ambystoma opacum (Green).

Mt. Vernon, an immature specimen with the transverse bars not apparent, rather irregularly mottled with white, probably recently transformed from an egg laid in the fall (see Dunn, 1917).

Plethodon yonahlossee Dunn.

White Top (4000 feet), 6 (new record for Virginia); Linville (4200 feet), 8.

The habitat and habits of this salamander are the same at White Top as at Linville. At the latter place specimens were taken at the original type locality and also about five miles nearer Blowing Rock, in a second growth oak forest along the Yonahlossee road.

Plethodon glutinosus glutinosus (Green).

Mt. Vernon, 4; Midway, 1; White Top (up to 3800 feet), 12; Abingdon; Linville (up to 4200 feet), 15; Mt. Sterling (up to 3500 feet), 2; Spring City (1000 feet), 10; Anniston, 3.

Plethodon jordani Blatchley.

Mt. Sterling, 37 (new record for North Carolina); from 4000 to 4500 feet on Sharp Top Mt. Very common, especially in rotten logs. It apparently replaces *P. metcalfi* in the Smokies as the latter was not found on Sharp Top. Judging from the specimens I have seen *P. metcalfi*, *P. shermani*, and *P. jordani* form a closely related group. *P. shermani*, of which I have seen three specimens, the type and two others from Wayah Bald Mt. in the Nantahala Range, probably replaces *P. metcalfi* in that range just as *P. jordani* seems to do in the Smokies. Of *P. jordani* I have seen only the present series, and one other with no more definite locality than "Tennessee," but which in all probability came from the Smokies as did the type. Three of my series lacked the red stripe on the side of the head which is so striking a mark of this species. One of these had red dots on the legs. The specimens vary in the size of the stripe and in the amount of pigment present. This seems not at all correlated with age or sex.

Of *metcalfi*, I have seen the large series listed below and in addition some 150 specimens of my own collecting in the American Museum from the Blue Ridge and the Pisgah Ridge and others in Washington, Cambridge, and Philadelphia from other localities in the North Carolina mountains.

The vomerine tooth series is shortest in *shermani* and longest in *jordani* but individual variation in *jordani* and *metcalfi* may show specimens which have as few teeth as the Nantahala species. The parasphenoids are utterly unreliable for identification. I can detect very little difference in the proportions of these three forms, though the head of *jordani* is somewhat broader and the snout less swollen than in *metcalfi*. This, however, varies quite a bit in individuals. The surest characters then are those of color. All the known specimens of *shermani* have red legs. This is the only species from the Nantahala range. *P. jordani* from the Smokies is very black with a red stripe on the side of the head but in about 8% of the specimens this stripe is lacking. Dots of red may be present on the legs. I am inclined to believe that it is mere coincidence that in the one specimen with red on the legs the stripe is absent from the cheeks.

P. metcalfi is the lightest in body color and has no red markings. It was described from the Balsams and is further known from the Blue Ridge, the Pisgah Ridge, the Cowee Mts., and the Tuskwitty Range in North Carolina, the Iron Mts. in Tennessee and Virginia, and Brasstown Bald

Mt. in Georgia. It seems odd that no form of this group has yet been taken in the Black Mts. Probably all the ranges of the Southern Appalachians which have any considerable area above 3000 feet support an animal of this group. Most of them are inhabitated by *metcalfi* but on two ranges are forms which have developed or retained red in the coloration.

Plethodon metcalfi Brimley.

White Top (3500–4500 feet), 60 (new record for Virginia); Linville, 52.

Excessively common; with *D. o. carolinensis* the characteristic salamander of the woods above 3000 feet.

Plethodon cinereus (Green).

White Top (4000 feet), 9; Linville (4200 feet), 17; Crozet, 1.

Desmognathus quadra-maculatus (Holbrook).

White Top, 29; Abingdon, 2; Linville, 38; Mt. Sterling, 6.

Desmognathus monticola Dunn.

Midway, 5; Manteo, 3; White Top, 9; Linville, 8; Mt. Sterling, 4; Crozet, 4.

This species at Midway and Manteo lives at the heads of narrow deep ravines cut in the Piedmont plateau. Evidently mountain conditions are reproduced in these dark cool gorges.

Desmognathus fuscus fuscus (Rafinesque).

Midway, 8; Manteo, 4; White Top (5000 feet), 14; Spring City, 15 (one with 15 eggs July 30); Anniston, 19 (with eggs Aug. 8, Aug. 18); Crozet, 3.

It may seem odd to find this species on White Top, but the conditions there make it evident that *fuscus* has come in from the west and is able to hold its own on account of the large unforested area on White Top. On the higher open meadows of this mountain *fuscus* is the species of salamander around the springs, while *monticola* is found in the narrow gorges shaded by heavy stands of timber.

Desmognathus ochrophaeus carolinensis Dunn.

White Top (up to 5500 feet), 40 (new record for Virginia); Linville, 23; Mt. Sterling, 16.

Several of these were found in the spruce forest on top of White Top. No other salamanders reached so high—most dropping out as the pasture belt was reached.

Gyrinophilus porphyriticus (Green).

Midway, one adult and one larva in spring.

Gyrinophilus danielsi (Blatchley).

Linville, one adult under a piece of bark in woods and 4 larvæ in very small brooks.

Pseudotriton montanus Baird.

Abingdon, one adult in mud near a spring; Spring City, one adult under a log in woods, and 2 larvæ in a spring.

Pseudotriton ruber ruber (Sonnini).

Midway, one adult under a log in woods, 2 larvæ in a spring; Anniston, 26 adults and larvæ taken in springs; Crozet, one larva in a spring.

Pseudotriton ruber schencki (Brimley).

Mt. Sterling, one larva in a spring.

The true state of affairs is not reflected in the classification if we recognize *schencki* from the southern half of the Southern Blue Ridge and call the animals from the rest of the mountains *ruber*. As a matter of fact the animals of the northern half of the Southern Blue Ridge are as worthy of racial recognition as *schencki*. *P. schencki* is marked by clear coloration and by special amount of black pigment on the chin. The race to be described has almost no black pigment in the chin and, indeed, has less black pigment than either *ruber* or *schencki*.

Pseudotriton ruber nitidus, n. sp.

Type, M. C. Z., No. 5649, adult female; White Top Mt., Va., 4000 feet (under a log in woods); July 11, 1919; E. R. Dunn, collector.

Diagnosis.—A red salamander with no black pigment on distal half of tail and little or none on chin. Distinct spots on dorsal surface. No dark ground color.

Description of Type.—Sixteen costal grooves counting axillar, six intercostal spaces between appressed toes; head flattened, rounded in outline, no canthus rostralis, head width $5^1/_2$ in distance from snout to vent. Head length 4 in body length. A groove along neck from eye to gular fold, a groove from this vertically down past angle of jaw, lower eyelid prolonged backward in a narrow fold. Tail short, flattened at tip, a raised keel on dorsal surface. Fingers short 3, 2, 4, 1 in order of length. Toes 3, 4, 2, 5, 1 in order of length. Red, lighter below, definite scattered spots on top of head, on back, on top of proximal half of tail and on upper surfaces of limbs. No markings on body or tail ventral to a line joining insertions of legs. A few dots along lower lip and on throat. Vomerine tooth series confluent with parasphenoid series, well separated from each other, each forming a right angle and passing beyond outer border of choanae which are small.

Dimensions.—Total length, 97; head, 12; body, 49; tail, 36 mm.

Remarks.—Occasional young specimens of the other two races of *ruber* may show the coloration of this form, but as a rule the black lips of *schencki* and the spotted tail tip of *ruber* appear upon transformation. Besides the type one was taken at Abingdon at the edge of a spring. Others have been seen from Linville, Cane River, Cranberry, Spruce Pine, Roan Mt., and Old Fort, N. C. Brimley records *ruber* from Burnsville, N. C., in all probability referring to this form. Typical *schencki* occurs at Asheville School, near Asheville, N. C., and *schencki*, with a definite trend toward *nitidus* in the less black on the chin and on the tail, at Marshall, N. C. Apparently *nitidus* inhabits the area bounded by the Stone Mts. and Iron Mts. to the west, the Blue Ridge to the east and the Black Mts. to the

south. This region is more of a high plateau country than is the habitat of *schencki*, where the dissection is more mature. The range of *nitidus* is, then, that less dissected northern portion of the Southern Blue Ridge, which is also the region of *Leurognathus marmoratus* and of *Plethodon yonahlossee*. The type is remarkable in lacking a tongue, the slit for the tongue stalk being a mere groove. This is evidently due to some accident, but the animal seemed to be normal and to be getting along quite well without its complicated hyoid apparatus.

Eurycea gutto-lineata (Holbrook).

Mt. Sterling (1800 feet), one adult and 16 larvæ in spring; Anniston, one adult in spring; Morrisville, one adult in spring; Crozet, two adults in spring.

Eurycea longicauda (Green).

Mt. Sterling (1500 feet), one adult under a log in woods.

New record for North Carolina. In the South, as in the North, this animal seems to be working eastwards, but only north of the Potomac has it made much headway.

Eurycea bislineata bislineata (Green).

Midway, 1 larva; Manteo, 1 adult; Abingdon (2000 feet), 2 adults, 1 larva; Spring City (1500 feet), 3 adults.

It seems necessary, upon careful consideration, to separate the animals of the Southern Blue Ridge as a race of *bislineata*. This race is almost immediately recognizable, but it is rather hard to frame a definition, on account of its variability in color. I name it for Mrs. H. H. Wilder, who has done a great amount of work on the life history of the typical form.

Eurycea bislineata wilderae, n. sp.

Type, M. C. Z., No. 5848, adult male; White Top Mt., Va., 4000 feet (under log in woods); July, 1919; E. R. Dunn, collector.

Diagnosis.—Similar to *E. bislineata bislineata*, but adult male usually with cirri on upper jaw, and somewhat more slender in form, tail longer, markings usually a narrow black line on sides, broken or absent on distal half of tail.

Description of Type.—Costal grooves 15, counting axillar and inguinal. Four intercostal folds between appressed toes. Head width $6^1/_2$ times in length from snout to vent, head length $4^1/_2$ times in length of body. Head an elongate oval with blunt snout. Snout swollen, eye a little longer than its distance from tip of snout. Sides of naso-labial groove, swollen and prolonged into a cirrus whose tip is free and which is not an extension of the edge of the lip. Outline of upper jaw convex as viewed from the side, angle of jaw below eye and very narrowly separated from lower eyelid—a short groove connects edge of lip with groove of lower eyelid. A groove from eye along side of head almost to gular fold—latter on sides of neck to just above insertion of arm. Vomerine teeth series closely approximated

behind. Series equidistant from nares and from parasphenoid series, by $^2/_3$ length of vomerines, parasphenoids in two long narrow patches beginning behind middle of eye socket. Tail imperfect, a pointed ellipse in cross section. Yellow, a narrow black line from behind eye and above postocular groove, beginning as a series of spots on head, a line on the body, and breaking again into spots on the tail. Stripe distinctly bordered with lighter above and less distinctly below. Region between stripes dotted with black. Faint gray wash on sides. Limbs gray. Ventral surface immaculate.

Dimensions.—Total length, 56; head, 7; body, 27; tail (imperfect), 20 mm.

Variations.—No females seen have cirri. Occasional males lack them but I am unable to correlate this with age or season. The coloration is very variable. In general it is easy to distinguish a specimen of this form from one of the typical race and this on account of the sharp outlines of the black in *wilderae* and the usual absence in it of the dark wash, but occasional specimens are almost the reverse of this and, lacking all trace of the stripe, are uniformly dotted with black. Usually the stripe is absent on the distal half of the tail or is represented by a row of dots. But the color of *wilderae* is usually lighter and the markings more definite in outline than in any of the other races of *bislineata*. Besides the type and sixteen others from White Top Mt., Va., I have seen specimens of this form from Linville, Cranberry, Roan Mt., Black Mt., Mt. Mitchell, Cane River, Burnsville, Mt. Sterling, Pink Beds, Montreat, Blantyre, Brevard, Highlands and Henderson Co., North Carolina, from an unknown locality in Tennessee (probably in the Smokies) and from Clayton, Rabun Co., and Cherry Log, Gilmer Co., Ga. So that the range is the Southern division of the Blue Ridge. At Linville a batch of eggs was found hatching on July 19. They were attached to the under side of a stone in a brook just as are the eggs of *bislineata*.

White Top, 17; Linville, 8; Mt. Sterling, 11 larvæ.

Eurycea bislineata cirrigera (Green).

Anniston, adults, larvæ; Morrisville, larvæ.

Specimens from Anniston and Morrisville represent this southern race, characterized by cirri in the males and by the dark area below the stripe being mottled with white, especially on the tail.

Bufo americanus Holbrook.

White Top, 1; Linville, 3; Mt. Sterling, 1; Spring City, 4; Crozet, 1.

Bufo fowleri Garman.

Mt. Vernon, 1; Midway, 5; Linville, 2; Anniston, 6; Crozet, 2.

Acris gryllus (Le Conte).

Mt. Vernon, 1; Manteo, 1; Anniston.

Hyla cinerea evittata (Miller).

Mt. Vernon, 28.

Hyla crucifer Wied.

Mt. Vernon, 4; Linville.

Hyla versicolor Le Conte.

White Top, 1; Linville,.

Rana catesbeiana Shaw.

Mt. Vernon, 2; Anniston.

Rana clamitans Latreille.

Mount Vernon; Midway; Spring City, 1; Anniston, 2; Crozet, 1.

Rana sphenocephala (Cope).

Dogue Creek, 1; Anniston, 3.

Rana palustris Le Conte.

Mt. Vernon, 1; Manteo, 1; Midway, 1; Abingdon, 1; Spring City, 1.

Rana sylvatica Le Conte.

Mt. Vernon, 1; Abingdon.

Anolis carolinensis Voigt.

Anniston, 1.

Sceloporus undulatus (Latreille).

Mt. Vernon; Midway, 5; Manteo; Spring City, 1; Anniston, 1; Crozet.

Cnemidophorus sexlineatus (Linn.).

Midway; Spring City; Anniston.

Leiolopisma laterale (Say).

Mt. Vernon, 1; Midway, 1; Spring City, 1; Anniston, 1.

Plestiodon fasciatus (Linn.).

Mt. Vernon, 3; Midway, 1 (♀ with 12 eggs); Spring City, 2; Anniston, 3; Crozet, 1.

Carphophis amoena (Say).

Mt. Vernon, 1; Manteo, 1; Linville, 1; Spring City, 6; Anniston.

Diadophis punctatus edwardsii (Merrem).

Midway, 1; Linville, 2.

Heterodon contortrix (Linn.).

Midway, 1.

Coluber constrictor (Linn.).

Mt. Vernon, 1; Linville, 1; Spring City; Anniston.

Coluber flagellum (Shaw).

Anniston, 2.

Elaphe obsoleta confinis (B. and G.).

Chattanooga; Lookout Mt., 2000 feet, 1.

Lampropeltis getulus getulus (Linn.).

Mt. Vernon, 1.

Lampropeltis getulus niger (Yarrow).

Anniston, 1.

Lampropeltis triangulum triangulum (Lacepede).

Linville, 1.

Lampropeltis rhombomaculata (Holbrook).

Crozet, 1.

Natrix sipedon (Linn.).

Mt. Vernon; Midway, 2; White Top; Abingdon, 1; Linville, 3; Mt. Sterling, 3; Spring City, 2; Anniston, 2.

Natrix septemvittata (Say).

Midway, 3; Spring City, 1; Crozet, 2.

Thamnophis sauritus (Linn.).

Crozet, 1.

Thamnophis sirtalis (Linn.).

White Top, 1; Linville, 1.

Agkistrodon mokasen Beauvois.

Midway, 1.

Sistrurus miliarius (Linn.).

Morrisville.

Crotalus horridus Linn.

Mt. Sterling, 1; Anniston, 1.

Kinosternon odoratum (Latreille).

Anniston, 6; Manteo; Spring City.

Kinosternon subrubrum (Lacepede).

Mt. Vernon, 1; Midway, 1; Spring City.

Chelydra serpentina (Linn.).

Dogue Creek; Anniston, 2; Crozet.

Terapene carolina (Linn.).

Mt. Vernon; Midway; Anniston, 2; Crozet.

Chrysemys picta (Schneider).

Mt. Vernon; Midway, 1; Manteo, 1; Crozet.

Pseudemys concinna (Le Conte.)

Mt. Vernon, 1; Midway, 5.

Pseudemys elegans (Wied.).

Anniston, 1.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A LIST OF THE FISHES OF NEW JERSEY.

BY HENRY W. FOWLER.[1]

Fourteen years have passed since my very incomplete work, "The Fishes of New Jersey," appeared. Using the old work as a basis, the attempt in the present paper is to gather all the data relative to the distribution of each species. Only counties are mentioned from which each has been recorded. Where additional notes and materials have been studied the localities are indicated in parentheses. This contribution is therefore offered as a slight aid to geographical distribution. Two confused blennies are also indicated as additions to the fauna.

Samuel Latham Mitchill described four species from New Jersey, though only one is now admitted as valid. Like many other early writers he unfortunately proposed a large number of names which have fallen as synonyms. Charles Alexandre Le Sueur is really the first to carefully study New Jersey fishes. He described thirteen valid species and twenty-eight synonyms, though only four of the latter from New Jersey. Although Constantine Samuel Rafinesque described many of our species, very few were actually obtained in New Jersey. Achille Valenciennes described several New Jersey species and a great number of synonyms. Four species are credited to James Ellsworth De Kay, likewise many synonyms. Joseph Leidy, Theodore Nicholas Gill and John Adam Ryder were only incidentally interested in New Jersey Ichthyology.

Papers omitted or subsequent to those in my "Fishes of New Jersey" are as follows:

[1] Published by permission of the Academy of Natural Sciences of Philadelphia.

Charles Conrad Abbott (1843–1919).

1864. On Belone truncata and on the flesh of Lepidosteus. <Proc. Acad. Nat. Sci. Phila., 1863 (1864), p. 282.

1867. An ugly Customer. [Lepidosteus.] <Riverside Magazine, I, 1867, pp. 174–6.

1872. The Banded Sunfish (Mesogonistius chætodon Gill). <Hardwicke's Sci. Gossip, VIII, 1872, pp. 29–30, fig. 15.

—— The Pirate (Aphredoderus sayanus Cuvier). <L. c., pp. 151–2, fig. 103.

—— The Stone Age Fish and Fishing. [Lepidosteus osseus.] <L. c., pp. 268–70, fig. 183.

1873 Notes on the Gizzard-shad in New Jersey. [Chatœsus cepedianum.] <L. c., IX, 1873, pp. 55–6, fig. 36.

—— The Silver-fin (Hypsilepis analostanus Cope). <L. c., pp. 224–5, fig. 139.

1874. The Golden Minnow (Hybognathus osmerinus Cope). <L. c., X, 1874, pp. 9–10, fig. 9.

—— The Darter (Boleosoma olmstedi Storer). <L. c., pp. 57–8, fig. 49.

—— Note on the Breeding-habits of the Mud Minnow. [Melanura limi.] <Pop. Sci. Monthly, IV, 1874, pp. 744–5.

1875. The Big-eared Sunfish. <Hardwicke's Sci. Gossip, XI, 1875, pp. 7–9, fig.

—— Two Mud-loving Fishes. [Umbra pygmæa and Acantharchus pomotis.] <L. c., pp. 104–7, figs. 63–4. (An aquarial study of their color and certain habits.)

1876. Notes on the Habits of the Yellow Perch. <Field and Forest, I, 1876, pp. 3–4.

—— A Voracious Fish. [Esox tridecemlineatus.] <Forest and Stream, V, February 3, 1876, p. 404.

1877. Traces of a Voice in Fishes. <Amer. Nat., XI, 1877, pp. 147–56.

1879. Winter Habits of the Eel. <Sci. News, I, 1879, pp. 183–4.

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—— On the Habits of Certain Sunfish. [Mesogonistius chætodon and Enneacanthus simulans.] <Amer. Nat., XVII, 1884, pp. 1254–5.

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Joseph Leidy (1823–1891).

1888. Distinctive characters of Odontaspis littoralis. <Proc. Acad. Nat. Sci. Phila., 1888, pp. 162–4. (On Abbott's example, and jaws mostly from New Jersey.)

Eugene Smith (1860–1912).

1902. The Home Aquarium. New York. 1902. Fishes, pp. 74–129, figs. 48–87. (Popular account of local fishes about New York, with notes on their natural history in the aquarium.)

1905. Exolgossum east of the Delaware. <Science, n. s., XXII, pp. 119–120.

1912. Fundulus and fresh water. <L. c., n. s., CXXV, 1912, pp. 144–145.

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—— Some Unusual New Jersey Fishes. <Science, XXIV, November 9, 1906, pp. 596–7.

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—— A Supplementary Account of the Fishes of New Jersey. <Rep. N. J. State Mus., 1906 (1907), pp. 251–350, pls. 70–122, 44 text figures.

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—— Notes on New Jersey Fishes. <Rep. N. J. State Mus., 1908 (1909), pp. 351–92.

—— Fundulus luciæ again in New Jersey. <Science, XXX, October 15, 1909, p. 526.

—— A new species of Fish of the genus Atopichthys, with notes on New Jersey Fishes. <Proc. Acad. Nat. Sci. Phila., 1909, pp. 406–8, fig.

—— The Smooth Hound and Some Other Fishes in New Jersey. <Science, XXX, December 3, 1909, p. 815.

1911. Little Known New Jersey Fishes. <Proc. Acad. Nat. Sci. Phila., 1910 (January 13, 1911), pp. 599–602.

—— A New Flat Fish from New Jersey. <L. c., 1911 (May 24), pp. 200–3.

1912. Records of Fishes for the Middle Atlantic States and Virginia. <L. c., 1912, pp. 34–59, 2 figs. (New Jersey, pp. 35–41.)

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1914. Description of a new Blenny from New Jersey, with notes on other Fishes from the Middle Atlantic States. <Proc. Acad. Nat. Sci. Phila., 1914 (June 24), pp. 342–88, 1 fig. (New Jersey, pp. 342–6.)

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1920. Notes on New Jersey, Pennsylvania and Virginia Fishes. <Proc. Acad. Nat. Sci. Phila., 1919 (1920), pp. 292–300. (New Jersey, pp. 292–98.)

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RAYMOND C. OSBURN.

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CHARLES H. TOWNSEND.

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LOUIS HUSSAKOF.

1916. Evidence of the Presence of Carcharodon on the New Jersey Coast during the Past Summer. <Copeia, November 24, 1916, No. 37, pp. 86–7.

JOHN T. NICHOLS.

1916. Supplementary Note on Carcharodon carcharias Off South Amboy. <Copeia, November 24, 1916, No. 37, p. 87.

1918. Fishes of the Vicinity of New York City. <Handbook Series, No. 7, Am. Mus. Nat. Hist., New York, pp. 18–118. (Popular illustrated paper, with list of species.)

W. W. Welsh.

1916. Measurements of a Large Example of Cestracion zygæna (Linnæus). <Copeia, December 24, 1916, No. 38, pp. 94–5.

PETROMYZONIDÆ.[1]

Petromyzon marinus Linnæus. Lamprey.

Atlantic (Nancock Creek), Burlington (Dutch Neck fishery, Florence, Burlington), Cape May (Cedar Swamp Creek Forks), Camden (Magnolia), Cumberland (Bay Side, Bridgeton), Essex, Gloucester (Oldman's Creek, Pitman), Mercer and Monmouth Counties.

Entosphenus aepypterus (Abbott). Brook Lamprey.

Bergen and Camden Counties. The late Henry Hales, of Ridgewood, informed me in 1909 of the occurrence of small lampreys in the Hackensack River where it joins the Saddle River. On two occasions he obtained them in the Hackensack several years previously. They were caught in May, in the upper water, near the dam used for water-supply.

CARCHARIIDÆ.

Carcharias taurus Rafinesque. Sand Shark.

Atlantic, Cape May[2] (Holly Beach, Anglesea), Camden, Monmouth (Asbury Park, lower New York Bay), Ocean (Barnegat Inlet), Salem (Delaware River opposite mouth of Alloway Creek), Union (Perth Amboy in Raritan Bay) Counties.

ALOPIIDÆ.

Alopias vulpinus (Bonnaterre). Thresher Shark.

Atlantic and Cape May Counties.

ISURIDÆ.

Isurus nasus (Bonnaterre). Mackerel Shark.

Reported from Cape May as rare straggler.[3]

Isurus tigris (Atwood).[4] Porbeagle.

Atlantic and Monmouth Counties.

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[1] In Man. Vert. East. U. S., Ed. 8, 1899, p. 8, Jordan gives "N. York to South America" for the range of *Branchiostoma caribaeum* Sundevall. Just what this statement is worth I do not know, as no further details appear. Possibly *Amphioxus lanceolatus* as recorded by Andrews from lower Chesapeake Bay may represent this species.

[2] The jaws I recorded from Townsend's Inlet as *Lamna cornubica* in Rep. N. J. State Mus., 1905 (1906), p. 56, are really those of the present species.

[3] *Lamna cornubica* T. H. Bean, Bull. U. S. F. Com., 7, 1887 (1889), p. 256 (N. Lat. 38° 7′ W. Long. 74° 21′); Fowler, Rep. N. J. State Mus., 1905 (1906), p. 56 (Cape May); Fowler, Science, 24, November 9, 1906, p. 596 (Sea Isle City).

[4] Possibly *Lamna punctata* Wilder, Science, I, November 6, 1880, p. 236, from Great Neck, Long Island, is also this species.

Carcharodon carcharias (Linnæus). Great White Shark.

Recorded by Hussakof, later by Nichols, from Monmouth County. Several bathers (Charles Epting Vansant at Beach Haven, Charles Bruder at Sea Girt, Lester Stillwell and Stanley Fisher at Matawan) were said to have perished from attacks by large sharks, likely this species, during the summer of 1916.

Cetorhinus maximus (Gunner). Basking Shark.

Monmouth County. Only known from Le Sueur's early account of *Squalus elephas.*

GALEORHINIDÆ.

Mustelus canis (Mitchill). Smooth Dog Shark.

Atlantic, Cape May, Cumberland (Bay Side), Monmouth, Ocean (Seaside Park), Salem (Delaware River near mouth of Alloway Creek and Pennsville) Counties.

EULAMIIDÆ.

Galeocerdo arcticus (Fabricius). Tiger Shark.

Cape May County. The jaws of a large example obtained many years ago in Delaware Bay from W. J. Bates, in the Academy, also the pair from Beesley's Point.

Eulamia obscurus (Le Sueur). Dusky Shark.

Atlantic, Cape May and Monmouth Counties. Gebhard mentions[1] a New York specimen, and one of seven hundred pounds taken at Deal Beach,[2] may really be the following species.

Eulamia milberti (Müller and Henle). Milbert's Shark.

Atlantic, Camden, Cape May, Cumberland (Egg Island and Fortescue), Monmouth[3] and Union Counties.

Scoliodon terrae-novae (Richardson). Sharp-nosed Shark.

Cape May County. Mr. I. N. De Haven reports one at Sand Thoroughfare, near Absecon in Atlantic County, about 1899.

SPHYRNIDÆ.

Sphyrna tiburo (Linnæus). Bonnet-headed Shark.

Cape May County. One reported by Mr. T. D. Keim off Black Tom Island in the summer of 1906, said to have been about six feet long.

Sphyrna zygaena (Linnæus).

Atlantic, Cape May, Cumberland (Fortescue), Monmouth and Ocean Counties. The Academy first obtained an example in 1843, from Manasquan.

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[1] Eighth An. Rep. Reg. Univ. N. Y., 1855, p. 64.

[2] Forest and Stream, 35, August 7, 1890, p. 51.

The large example I reported as *Carcharhinus obscurus* in Rep. N. J. State Mus., 1907 (1908), p. 124, probably from near the mouth of Delaware Bay, is *Eulamia commersonii.* The record should be omitted from the present list.

[3] The example 1 recorded from Perth Amboy as *Eulamia obscurus* is undoubtedly the present species. Proc. Acad. Nat. Sci. Phila., 1910 (1911), p. 599.

SQUALIDÆ.

Squalus acanthias Linnæus. Spiny Dog Shark.

Atlantic, Cape May, Monmouth (Asbury Park and Seabright) and Ocean Counties. Not seen by me from Delaware Bay, though the Academy received an example from there in 1855.

SQUATINIDÆ.

Squatina dumeril Le Sueur. Angel Shark.

Atlantic and Cape May Counties.

PRISTIDÆ.

Pristis pectinatus Latham. Saw Fish.

Cape May County. A saw received in the Academy in 1846 from "off Cape Island" I have not located. Possibly it is one of the many saws in the collection without data.

The only New York record is by Schœpf,[1] for an example taken in July, 1782. This is later mentioned as *Pristis antiquorum* by De Kay, Gebhard, and apparently by Hall,[2] who refers it to New York Bay.

RAJIDÆ.

Raja erinacea Mitchill. Hedge-hog Skate.

Atlantic, Cape May, Cumberland (Bay Side), Monmouth, Ocean (Barnegat) Counties.

Raja ocellata Mitchill. Spotted Skate.

Atlantic, Burlington, Cape May, Cumberland (Bay Side), Monmouth, Ocean (Cholera Bank) Counties.

Raja scabrata Garman. Rough Skate.

Ocean County. An egg-case and young as *Raja radiata*.[3]

Raja eglanteria Lacépède. Bob-tailed Skate.

Atlantic, Cape May (Bare Hole Fishing Grounds, Dias Creek, Five Fathom Bank, Hereford Inlet, Holly Beach, McCrie's Shoal, Stone Harbor, Uncle Eph's Shoal), Cumberland (Bay Side), Monmouth (Ocean Grove), Ocean Counties.

Raja laevis Mitchill. Barn-door Skate.

Atlantic, Cape May (Ocean City), and Monmouth Counties.

TORPEDINIDÆ.

Torpedo nobiliana Bonaparte. Torpedo.

Cape May and Monmouth Counties.

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[1] *Squalus pristis* in Beob. Nat. Ges. Berlin, 2, 1788, p. 185.
[2] Twenty-fourth Rep. N. Y. State Mus., 1870, p. 36.
[3] Fowler, Proc. Acad. Nat. Sci. Phila., 1910, p. 470.

DASYATIIDÆ.

Urobatis jamaicensis (Cuvier). Round Sting-ray.

Known from Garman's record of a fœtus credited to New Jersey.

Dasyatis centroura (Mitchill). Thorny Sting-ray.

Atlantic (Atlantic City), Cape May, Monmouth (Ocean Grove and Port Monmouth) Counties.

Dasyatis hastatus (De Kay). Round Sting-ray.

Cape May County. Recorded by Baird and Bean. The examples I recorded from Green Creek belong to this species, rather than *D. centroura*.[1] Gebhard mentions[2] the species from New York Bay, and a later reference[3] is based on a very early occurrence.

Dasyatis say (Le Sueur). Say's Sting-ray.

Atlantic, Cape May and Ocean Counties. Müller and Henle record it from New York as *Trygon sayi* on Milbert's material.[4] It doubtless occurs along the northern shores of New Jersey, as I have it from Barnegat Inlet.

Pteroplatea micrura (Schneider). Butterfly Ray.

I have no material from New Jersey, though several times reported from Cape May County (off Wildwood and in Delaware Bay).

MYLIOBATIDÆ.

Myliobatis freminvillii Le Sueur. Eagle Ray.

Cape May County. Frequent in mid and late summer.

RHINOPTERIDÆ.

Rhinoptera bonasus (Mitchill). Cow-nosed Ray.

Atlantic, Cape May, Cumberland (off Egg Island), and Monmouth Counties.

MOBULIDÆ.[5]

Manta birostris (Walbaum). Manta Ray.

Cape May County. LeSueur and Mitchill, both in 1824, describe it from "near the entrance to Delaware Bay."

ACIPENSERIDÆ.

Acipenser sturio Linnæus. Sturgeon.

Atlantic, Burlington (Burlington, Dutch Neck fishery, Florence), Cape May (Fishing Creek), Camden, Cumberland (Bay Side, Bridgeton),

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[1] Proc. Acad. Nat. Sci. Phila., 1909, p. 407.

[2] Ninth An. Rep. Reg. Univ. N. Y., 1856, p. 29.

[3] Forest and Stream, I, August 28, 1873, p. 40.

[4] Besch. Plagiost., 1841, p. 166.

[5] Though *Mobula hypostomus* (Bancroft) is not known from New Jersey, Garman gives its range as Brazil to New York. Possibly *Cephalopterus vampirus* De Kay, Geol. Rep. N. Y., 1840, p. 31, from New York, may be *M. hypostomus*.

Gloucester (Oldman's Creek and Bridgeport), Mercer, Monmouth, Ocean (Barnegat), Salem Counties.

Acipenser brevirostrum Le Sueur. Short-nosed Sturgeon.

Burlington, Cape May, Mercer, Gloucester Counties.

LEPISOSTEIDÆ.

Lepisosteus osseus (Linnæus). Long-nosed Gar-pike.

Mercer and Warren Counties. Schœpf mentions it as *Esox osseus*[1] and later Mitchill records one from Long Island in Scudder's Museum.

ELOPIDÆ.

Megalops atlanticus Valenciennes. Tarpon.

Atlantic, Cape May (Stone Harbor), Monmouth and Ocean Counties.

Elops saurus Linnæus. Ten-pounder.

Cape May County.

ALBULIDÆ.

Albula vulpes (Linnæus). Lady Fish.

Once recorded from New Jersey without definite locality, from a specimen in Blackford's market.[2]

DOROSOMIDÆ.

Dorosoma cepedianum (Le Sueur). Mud-shad.

Atlantic, Burlington (Beverly, Delanco, Florence, Riverton), Cape May, Gloucester, Mercer Counties.

CLUPEIDÆ.

Etrumeus teres (De Kay). Round Herring.

Atlantic, Cape May and Ocean Counties. Valenciennes reported it from "Philadelphie," likely from New Jersey.[3]

Clupea harengus Linnæus. Herring.

Cape May County.

Pomolobus mediocris (Mitchill). Fall Herring.

Atlantic (Nancock Creek), Burlington (Dutch Neck fishery), Cape May, Cumberland (Bay Side), Monmouth, Ocean Counties.

Pomolobus pseudoharengus (Wilson). Alewife.

Atlantic (Nancock Creek), Burlington (Beverly, Burlington, Florence, Riverton), Cape May (Cape May, Dias Creek, Fishing Creek, Higbee's Beach, Johnson's Run in Tuckahoe River), Camden (Camden, Palmyra), Cumberland (Bridgeton), Gloucester (Oldman's Creek), Hoboken, Mercer (Crosswicks Creek), Middlesex and Monmouth (Manasquan) Counties.

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[1] Beob. Nat. Gesell. Fr. Berlin, 2, 1788, p. 177.

[2] *Albula condryhcus* in Forest and Stream, 11, October 10, 1878, p. 208.

[3] Hist. Nat. Poiss., 20, 1847, p. 310.

Pomolobus aestivalis (Mitchill). Summer Herring.

Atlantic (Nancock Creek), Burlington (Dutch Neck fishery, Florence), Cape May, Gloucester, Hoboken, Mercer, Middlesex and Monmouth Counties.

Alosa sapidissima (Wilson). Shad.

Atlantic (Nancock Creek, Somer's Point), Bergen (Fort Lee, Passaic River), Burlington (Beverly, Burlington Island, Dutch Neck fishery, Riverton), Camden (Cooper's Creek), Cape May (Cape May Point), Cumberland (Bridgeton, Cohansey Creek, Egg Island, Maurice River), Gloucester (Big Timber Creek, Mantua Creek, Oldman's Creek, Woodbury Creek), Hudson (New York Bay), Mercer (Scudder's Falls, Well's Falls), Monmouth (Asbury Park, Manasquan River, Red Bank, Sandy Hook Bay, Shrewsbury River), Middlesex (Perth Amboy and Raritan Bay), Ocean (Barnegat, Metedecong River), Salem (Alloway Creek, Oakwood Beach, Penn's Grove), Somerset (Bound Brook) Counties.

Opisthonema oglinum (Le Sueur). Thread Herring.

Atlantic and Cape May (Cape May) Counties.

Brevoortia tyrannus (Latrobe). Menhaden.

Atlantic (Nancock Creek), Burlington, Camden, Cape May (Dias Creek, Fishing Creek, Ocean City), Cumberland (Bay Side, Cohansey Creek), Gloucester (Oldman's Creek), Middlesex (Perth Amboy), Monmouth (Asbury Park, Long Branch, Ocean Grove, Raritan Bay, Red Bank) and Ocean Counties.

ENGRAULIDIDÆ.

Anchovia duodecim (Cope). Cope's Anchovy.

Cape May County. Only known from the type.

Anchovia eurystole (Swain and Meek). Slender Anchovy.

Atlantic, Cape May and Ocean Counties.

Anchovia brownii (Gmelin). Broad-banded Anchovy.

Atlantic and Cape May Counties.

Anchovia mitchilli (Valenciennes). Sperlin.

Atlantic (Atlantic City), Cape May (Cape May Point), Cumberland (Egg Island), Monmouth (Asbury Park and Manasquan), Ocean (Seaside Park), Salem Counties.

SALMONIDÆ.

Salvelinus fontinalis (Mitchill). Brook Trout.

Bergen (Hackensack River at Englewood, Passaic River at Paterson and Oakdale), Burlington (Black and Kettle Runs, tributary to Haines Creek, Barton's Run, all Rancocas basin), Camden (Trout Run at Clementon, Kirkwood and White Horse, all Cooper's Creek basin), Cumberland (Newville), Essex (Brookdale), Gloucester (Little and Big Lebanon Runs, tributaries to Big Timber Creek; Mantua Creek at Pitman; Little Ease and Scotland Runs, tributaries of Maurice River; Woodbury Creek),

Hudson (Hackensack River basin near Jersey City Heights), Mercer (Crosswicks Creek at Trenton), Middlesex (mouth of Raritan at Perth Amboy), Monmouth (Asbury Park lakes, Eatontown, Hockhocken, Pine Brook and tributary of Shrewsbury River), Morris (Lake Hopatcong and Sucassuna), Ocean (Crosswicks Creek near New Egypt), Passaic (Greenwood Lake), Salem, Sussex (Delaware River), Warren (Belvidere). In many localities formerly, now largely introduced.

ARGENTINIDÆ.

Osmerus mordax (Mitchill). Smelt.

Bergen, Essex, Hoboken, Mercer, Middlesex, Monmouth (introduced in Lake Hopatcong) and Passaic (introduced in Greenwood Lake) Counties.

PARALEPIDIDÆ.

Paralepis barracudina Fowler and Phillips.

Described from Corson's Inlet in 1910.

SYNODONTIDÆ.

Synodus foetens (Linnæus). Lizard-fish.

Atlantic, Cape May and Ocean Counties.

TACHYSURIDÆ.

Bagre marinus (Mitchill). Gaff-topsail Cat.

Cape May, Monmouth, Ocean and Salem Counties.

ICTALURIDÆ.

Ameiurus catus Linnæus). White Cat.

Atlantic (Nancock Creek), Burlington (Delanco, Dutch Neck fishery, Riverton), Camden (Camden and Westville), Cape May (Cedar Swamp Creek and Johnson's Run), Cumberland (Bay Side and Bridgeton), Gloucester (Pitman), Hunterdon (Lambertville), Mercer (Millstone River near Princeton), Passaic (Greenwood Lake), Salem (Pedricktown) Counties.

Ameiurus natalis (Le Sueur). Yellow Cat.

Atlantic, Burlington, Camden, Cape May and Salem Counties.

Ameirus nebulosus (Le Sueur). Common Cat.

Atlantic, Bergen (Saddle River at Ridgewood), Burlington (Beverly, Brown's Mills, Delanco, East Branch of Haines Creek and its tributaries, Black and Kettle Runs, Florence, Newton Bridge, Oliphant's Mill), Camden (Blackwood Lake), Cape May (Cedar Swamp and Dias Creeks), Essex, Gloucester (Pitman and Black Pond at Swedesboro), Hunterdon (Croton), Mercer (Assanpink Creek and Carnegie Lake at Princeton), Middlesex (Raritan River), Monmouth (Manasquan River), Morris (Upper Longwood Pond of Lake Hopatcong), Passaic (Greenwood Lake), Salem (Elmer and Palastine Lakes), Sussex (Culver's Pond), Warren Counties.

Schilbeodes gyrinus (Mitchill). Tadpole Cat.

Atlantic (May's Landing), Bergen, Burlington (Burlington), Camden, Cumberland, Essex, Gloucester, Mercer (Assanpink Creek near Trenton), Morris, Passaic, Salem, Sussex Counties.

Schilbeodes insignis (Richardson). Margined Cat.

Hunterdon, Mercer and Sussex Counties.

CYPRINIDÆ.[1]

Hybognathus nuchalis regius (Girard). Silvery Minnow.

Burlington (Burlington, mouth of Crosswicks Creek, Delanco, Riverton), Camden (Cooper's Creek at Haddonfield, Camden, Palmyra), Mercer (Crosswicks Creek, Duck Island, Delaware River at Trenton), Middlesex and Salem Counties.

Pimephales notatus (Rafinesque). Blunt-nosed Minnow.

Mercer and Hunterdon Counties.

Semotilus bullaris (Rafinesque). Fall Fish.

Atlantic (May's Landing), Bergen (Hackensack River above Oradel), Burlington (East Branch of Haines Creek, Mount Holly, Newton's Mill, Oliphant's Mill), Cape May (Cedar Swamp Creek and Wallace's Run, a tributary of Tuckahoe River), Gloucester (Black Pond at Swedesboro, introduced, Mantua and Timber Creeks), Hudson, Hunterdon, Mercer (Carnegie Lake at Princeton and McCall's Brook at Trenton), Morris, Passaic, Somerton (Raritan River below Bound Brook), Warren Counties.

Semotilus atromaculatus (Mitchill). Creek Chub.

Burlington, Hunterdon, Mercer (McCall's Brook), Morris (Lake Hopatcong), Passaic, Warren (Belvidere) Counties.

Abramis crysoleucas (Mitchill). Roach.

Atlantic (Bargaintown on Nancock Creek), Bergen (Saddle River at Ridgewood and Vreeland's Pond), Burlington (Assiscunk Creek, Burlington, Burlington Island, Delaware River at Delanco, East Branch of Haines Creek, Florence, Newton's Bridge, Oliphant's Mill), Camden (Camden, Newton and Pensauken Creeks), Cape May (Dias Creek, Fishing Creek at Fulling Mill Bridge, Green and Sluice Creeks, Wallace's Run tributary to Tuckahoe River), Cumberland, Essex, Gloucester (Oldman's Creek, Pitman, Still Run at Porchtown), Hunterdon, Mercer (Assanpink Creek, Duck Island in Delaware River, Shabbaconk Creek), Morris (Succasunna), Ocean, Passaic, Salem (Elmer, Mud Creek and pond below), Sussex and Warren Counties.

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[1] Abbott records *Leuciscus margarita* (Cope) from the mouth of the Assanpink Creek at Trenton. As the material on which this rests has long since disappeared, together with no subsequent New Jersey specimens having been taken and the great possibility of wrong determination, the species had best be omitted. Likewise Abbott's record for *L. vandoisulus* Valenciennes, and Eugene Smith's mention of *Hybopsis kentuckiensis* (Rafinesque), recorded from "two different points on the Passaic River." Smith's specimens do not appear to have been located.

Notropis bifrenatus (Cope). Bridled Minnow.

Bergen, Burlington (Assiscunk Creek, Burlington and Dutch Neck), Camden, Cumberland, Essex, Gloucester, Mercer and Morris Counties.

Notropis procne (Cope). Swallow Minnow.

Gloucester, Mercer and Middlesex Counties. Although recorded from the Palisades and vicinity of New York City, it is quite likely that the preceding species is confused by Eugene Smith.

Notropis hudsonius amarus (Girard). Spawn-eater.

Bergen, Burlington (Burlington, Florence and Rancocas Creek at Delanco), Camden (Camden), Mercer and Salem Counties.

Notropis whipplii analostanus (Girard). Silver-fin.

Burlington (Assiscunk Creek, Dutch Neck fishery, Florence and Riverton), Camden, Gloucester, Hunterdon and Mercer Counties.

Notropis cornutus (Mitchill). Red-fin.

Bergen (Saddle River at Ridgewood and Hackensack River at Westwood), Burlington, Essex, Gloucester (Sewell and Wenonah), Hunterdon, Mercer (Assanpink Creek), Morris (Lake Hopatcong), Passaic, Salem, Sussex and Warren Counties.

Notropis chalybaeus (Cope). Iron-colored Minnow.

Atlantic (May's Landing), Burlington (East Branch of Haines Creek, Delanco), Camden, Cape May, Cumberland, Gloucester, Mercer, Passaic, Salem (pond near Muddy Creek) Counties.

The dark Coastal Plains form described as *N. chalybæus abbotti* Fowler in 1904, from the Batsto.

Notropis photogenis amoenus (Abbott). Attractive Minnow.

Burlington (Delaware River at Burlington), Camden (Camden), Mercer and Passaic Counties. Originally described from the typical Piedmont at Trenton.[1]

Rhinichthys cataractae (Valenciennes). Long-nosed Dace.

Hunterdon, Mercer, Morris and Warren Counties.

Rhinichthys atronasus (Mitchill). Black-nosed Dace.

Bergen (Fort Lee and Ridgewood in Saddle River), Essex, Hunterdon, Mercer, Morris (Lake Hopatcong), Passaic and Warren Counties.

Exoglossum maxillingua (Le Sueur). Cut-lips.

Hunterdon and Passaic Counties.

CATOSTOMIDÆ.[2]

Catostomus commersonnii (Lacépède). Common Sucker.

Atlantic (Nancock Creek at Bargaintown), Bergen (Ridgewood and

[1] *Alburnellus amoenus* Abbott, Am. Nat., 8, 1874, p. 334.

[2] *Carpiodes cyprinus* (Le Sueur) though early credited to Philadelphia by Valenciennes (Hist. Nat. Poiss., 17, 1844, p. 353) and later mentioned by Cope and Abbott, is not certainly known from New Jersey.

Passaic River), Burlington (Assiscunk Creek, Burlington, Delanco, Florence, Newton's Mill, Oliphant's Mill), Camden (Pensauken), Cape May (Cedar Swamp and Dennis Creeks), Cumberland (Bridgeton), Essex, Gloucester (Turnersville), Hunterdon, Mercer (Carnegie Lake at Princeton and Delaware River at Trenton), Morris (Upper Longwood Pond), Monmouth (lakes at Asbury Park and Manasquan River), Ocean, Passaic, Somerset (Plainfield), Sussex and Warren Counties.

Catostomus nigricans Le Sueur. Black Sucker.

Bergen, Mercer (Carnegie Lake), and Morris Counties. The material in the Academy was simply labeled New Jersey and likely came from Morris County. Also in the same region I saw a single example in a tributary of the Raritan east of Chester. Its rarity suggests the possibility of introduction.

Erimyzon sucetta oblongus (Mitchill). Chub Sucker.

Atlantic (Bargaintown on Nancock Creek and Pancoast Mills), Bergen (Ridgewood on Saddle River and Hackensack River at Westwood), Burlington (Atco on Mullica River, Black Run tributary to Haines Creek and East Branch of latter, Burlington, Rancocas Creek at Delanco, Newton's Bridge, Oliphant's Mill), Camden, Cape May (Dennis, Dias, Fishing and Goshen Creeks, Johnson's Run tributary to Tuckahoe River), Cumberland (Bridgeton), Essex, Gloucester (Still Run at Porchtown), Mercer (Assanpink and Carnegie Lake at Princeton), Morris (Budd Lake), Salem, Sussex and Warren Counties.

Moxostoma macrolpeidotum (Le Sueur). Red-horse.

Though originally described from the Delaware by Le Sueur, where apparently now rare, as I have not seen any examples. Eugene Smith records it doubtfully from the upper Passaic basin.

ANGUILLIDÆ.

Anguilla rostrata (Le Sueur). Eel.

Atlantic (Bargaintown on Nancock Creek, Pancoast Mills), Bergen (Hackensack River), Burlington (Black Run and East Branch of Haines Creek, Brown's Mills, Delanco, Florence, Atco on the Mullica River, Newton's Bridge and Oliphant's Mill), Camden (Camden and Pensauken), Cape May (Grassy Sound, Johnson's Run, Ludlam Bay, Wallace's Run, Whale Creek), Cumberland (Bay Side), Gloucester (Oldman's Creek), Hunterdon, Mercer (Assanpink Creek), Middlesex (The Kills), Monmouth (Fairhaven, Oceanic, Red Bank, Shrewsbury River), Ocean (Barnegat Inlet, Toms River), Passaic (Greenwood Lake, Passaic River formerly, Vreeland's Park), Salem (Elmer), Sussex and Union Counties.

CONGRIDÆ.

Conger conger (Linnaeus). Conger Eel.

Atlantic, Cape May (Cape May), Monmouth (Asbury Park, Cholera Bank) Counties.

Leptocephalus phillipsi (Fowler).

Described from Corson's Inlet in 1909[1] and found again in 1912.

Leptocephalus novae-caesariensis (Fowler).

Described from Beesley's Point in 1912.[2]

ESOCIDÆ.

Esox americanus (Gmelin). Banded Pickerel.

Atlantic, Bergen, Burlington, Camden (Blackwood), Cape May, Cumberland (Bridgeton), Gloucester (Washington Park), Hunterdon, Mercer, Middlesex (Outcall's Pond near Spotswood), Morris, Ocean, Salem and Sussex Counties.

Esox tridecemlineatus Mitchill. Chain Pickerel.

Atlantic, Bergen (Saddle River at Ridgewood and Ramapo River), Burlington (Brown's Mills), Camden, Cape May, Cumberland (Millville Lake), Essex (Caldwell and Brookdale), Gloucester, Hunterdon (Croton Pond), Mercer, Monmouth (Deal Lake at Asbury Park), Morris (Budd Lake and Splitrock Pond), Ocean (Forked River, Metedecong River, Toms River), Passaic (Greenwood Lake), Salem, Sussex (Dicker and Double Ponds, Echo, Panther, Pickatummy and Swartzwood Lakes, Morris Pond), Warren (Allamuchy Pond) Counties.

UMBRIDÆ.

Umbra pygmaea (De Kay). Mud Minnow.

Atlantic, Bergen, Burlington (Burlington, Dutch Neck fishery), Camden, Cape May (Green Creek), Cumberland, Essex, Gloucester (Pitman), Mercer, Morris and Salem Counties.

PŒCILIIDÆ.

Fundulus majalis (Walbaum). May Fish.

Atlantic, Cape May (Townsend's Inlet), Cumberland (Bay Side), Hudson, Monmouth and Ocean Counties.

Fundulus heteroclitus macrolepidotus (Walbaum). Mummichog.

Atlantic (Atlantic City, Nancock Creek), Burlington (Assiscunk Creek, Bread and Milk Island, Burlington, Centerton, Delanco, Florence, Riverside, Riverton), Camden (Camden), Cape May (Anglesea, Dias Creek, Fishing Creek, Pond Creek, Stone Harbor, Townsend's Inlet), Cumberland (Bay Side), Gloucester (Mantua Creek), Hudson, Mercer (Bordentown, Crosswicks, Duck Island), Monmouth, Ocean and Salem Counties.

Fundulus diaphanus (Le Sueur). Barred Killifish.

Atlantic, Bergen (Englewood), Burlington (Burlington, Centerton, Delanco, Florence, Florence Bar, Riverside, Riverton), Cape May (Dennis, Dias, Fishing and Green Creeks, Teal's Branch of Pond Creek), Cumber-

[1] *Atopichthys phillipsi* Fowler, in Proc. Acad. Nat. Sci. Phila., 1909, p. 406, fig.

[2] *Atopichthys novae-caesariensis* Fowler, Proc. Acad. Nat. Sci. Phila., 1912, p. 35, fig.

land, Gloucester, Hudson, Hunterdon, Mercer (Assanpink and Crosswicks Creeks), Salem and Warren Counties.

Fundulus luciae (Baird). Brown Killifish.

Cape May, Cumberland and Ocean Counties.

Lucania parva (Baird). Rain-water Fish.

Atlantic, Cape May, Cumberland, Monmouth and Ocean (Cedar Creek) Counties.

Cyprinodon variegatus Lacépède. Pursy Minnow.

Atlantic, Cape May (Anglesea, Peck's Bay, Townsend's Inlet), Cumberland, Hudson, Monmouth and Ocean Counties.

Gambusia affinis (Baird and Girard). Top Minnow.

Camden (introduced in 1904), Burlington (introduced in 1904, unsuccessful) and Cape May Counties. First discovered in streams of the last during 1907. When the same streams were examined in 1918 the species had disappeared.

SYNGNATHIDÆ.

Syngnathus fuscus Storer. Pipe Fish.

Atlantic, Cape May, Hudson, Monmouth and Ocean Counties.

Hippocampus hudsonius De Kay. Sea Horse.

Atlantic, Cape May (Sea Isle City), Cumberland (Fortescue) and Monmouth Counties.

EXOCŒTIDÆ.

Exocoetus volitans Linnæus. Flying Fish.

Two obtained August 27, 1910, at Cape May beach.[1]

Cypselurus exiliens (P. L. S. Müller).

Valenciennes records it from New Jersey, though without further locality.[2]

Cypselurus heterurus (Rafinesque).

Included as Dr. H. M. Smith mentions it from the north shores in 1894. Abbott reported a specimen from Beesley's Point as *Exocetus noveboracensis* in 1868. I have been unable to locate it in the Academy.

Cypselurus nigricans (Bennett). Black Flying Fish.

A fine one secured at Sea Isle City in 1915.[3]

HEMIRAMPHIDÆ.

Hyporhamphus unifasciatus (Ranzani). Half Beak.

Atlantic, Cape May and Monmouth Counties.

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[1] Fowler, Proc. Acad. Nat. Sci. Phila., 1910 (1911), p. 601.

[2] *Exocoetus exiliens*, in Hist. Nat. Poiss., 19, 1846, p. 85.

[3] Fowler, Copeia, No. 27, February 24, 1916, p. 10.

The record of *Cypselurus furcatus* by Abbott in 1868, from "off shore," may be dropped, as no reference to the material is given. Likewise his reference to the Saury, as *Scombresox scutellatus*, as no New Jersey specimens have been found in recent years.

Hemiramphus brasiliensis (Linnæus). Balào.

Three secured at Sea Isle City in 1906.[1]

Euleptorhamphus brevoortii Gill. Ribbon Half Beak.

Once obtained at Atlantic City.

BELONIDÆ.

Strongylura marina (Walbaum). Green Gar.

Atlantic (Nancock Creek), Burlington (Burlington, Florence), Cape May (Cedar Swamp Creek and Holly Beach), Cumberland (Fortescue), Gloucester (Oldman's Creek), Hudson (Black Tom Island), Mercer (Duck Island), Middlesex, Monmouth, Ocean, Salem (Oakwood Beach) Counties.

Strongylura acus (Lacépède). Houndfish.

Atlantic and Cape May Counties. It is quite likely the record for *Tylosurus gladius* from Ocean City[2] is the young of the present species, rather than of *S. raphidoma* (Ranzani), with which it has been identified by most writers.

SPHYRÆNIDÆ.

Sphyraena barracuda (Walbaum). Great Barracuda.

Young recorded as *S. picuda*, from Beesley's Point.[3]

Sphyraena borealis De Kay. Northern Barracuda.

Cape May and Monmouth Counties.

ATHERINIDÆ.

Membras vagrans (Goode and Bean). Rough Silversides.

Atlantic and Cape May Counties.

Menidia beryllina (Cope). Fresh-water Silversides.

Cape May, Cumberland and Monmouth Counties.

Menidia menidia notata (Mitchill). Silversides.

Atlantic, Cape May (Coxe's Hall Creek, Townsend's Inlet), Cumberland (Bay Side, Bridgeton), Monmouth (Asbury Park, Manasquan Inlet), Ocean and Salem Counties.

MUGILIDÆ.

Mugil cephalus Linnæus. Striped Mullet.

Atlantic and Cape May Counties.

Mugil curema Valenciennes. White Mullet.

Atlantic, Cape May (Anglesea and Cedar Swamp Creek), Monmouth and Ocean (Spray Beach) Counties.

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[1] Fowler, Science, 24, November 9, 1906, p. 596.

[2] T. H. Bean, Bull. U. S. F. Com., VII, 1887 (1888), p. 146, pl. 2, fig. 15.

[3] T. H. Bean, Bull. U. S. F. Com., VII, 1887 (1888), p. 145, pl. 2, fig. 14.

GASTEROSTEIDÆ.

Pungitius pungitius (Linnæus). Nine-spined Stickleback.

Hudson and Cape May Counties.

Gasterosteus aculeatus Linnæus. Two-spined Stickleback.

Bergen, Cape May, Cumberland, Hudson, Middlesex and Ocean Counties.

Apeltes quadracus (Mitchill). Three-spined Stickleback.

Atlantic (Atlantic City), Bergen, Burlington (Burlington, Florence), Camden (Camden), Cape May (Great Egg Harbor Bay), Cumberland, Mercer (Assanpink Creek), and Ocean (Beach Haven) Counties.

APHREDODERIDÆ.

Aphredoderus sayanus (Gilliams). Pirate Perch.

Atlantic, Burlington (Mount Holly in Rancocas Creek), Camden (Pensauken Creek), Cape May, Gloucester, Mercer and Salem Counties.

SCOMBRIDÆ.

Scomber scombrus Linnæus. Mackerel.

Atlantic, Cape May (Anglesea and Green Creek), Monmouth (Asbury Park and Manasquan) and Ocean Counties.

Scomber colias Gmelin. Chub Mackerel.

Cape May and Monmouth Counties.

Euthynnus pelamis (Linnæus). Oceanic Bonito.

Once recorded from off Manasquan, Monmouth County.[1]

Euthynnus alleteratus (Rafinesque). Little Tunny.

Monmouth and Ocean Counties.[2]

Thunnus thynnus (Linnæus). Tunny.

Cape May (Cape May and Ocean City), Monmouth (Asbury Park and Seabright) and Ocean Counties.

Sarda sarda (Bloch). Bonito.

Atlantic, Cape May, Monmouth (Asbury Park, Cholera Bank, Seabright), Ocean (Barnegat and Barnegat Inlet) Counties.

Scomberomorus maculatus (Mitchill). Spanish Mackerel.

Atlantic, Cape May (Cape May and Sea Isle City), Monmouth (Bradley Beach, Ocean Grove), and Ocean Counties.

Scomberomorus regalis (Bloch). Sier.

Cape May and Monmouth Counties.

TRICHIURIDÆ.

Trichiurus lepturus Linnæus. Cutlass Fish.

Atlantic, Cape May (Corson's Inlet), Monmouth and Ocean Counties.

[1] Bull. Zool. Soc. N. Y., No. 48, November, 1911, p. 811.

[2] Forest and Stream, December 22, 1892.

ISTIOPHORIDÆ.

Istiophorus nigricans (Lacépède). Sail Fish.

Cape May and Monmouth Counties.

XIPHIIDÆ.

Xiphias gladius Linnæus. Sword Fish.

Atlantic, Cape May, Monmouth and Ocean Counties.

CARANGIDÆ.[1]

Seriola zonata (Mitchill). Amber Fish.

Atlantic, Cape May (Great Egg Harbor Bay) and Monmouth Counties.

Seriola lalandi Valenciennes. Jenny Lind.

Cape May and Monmouth Counties.

Decapterus punctatus (Agassiz). Scad.

I have examined some of Moore's Avalon material. Abbott records it from Cape May.

Selar crumenophthalmus (Bloch). Goggle-eye.

Recorded from Beesley's Point by Gill.[2]

Caranx hippos (Linnæus). Crevallé.

Atlantic and Cape May (Cape May) Counties.

Caranx crysos (Mitchill). Yellow Crevallé.

Atlantic, Cape May and Monmouth (Belford, Long Branch, Shrewsbury Inlet[3]) Counties.

Caranx latus Agassiz. Jurel.

Recorded from Ocean County, from young example obtained in 1876.

Blepharis crinitus (Mitchill). Thread Mackerel.

Cape May County.

Vomer setapinnis (Mitchill). Plough Fish.

Cape May County.

Selene vomer (Linnæus). Moon Fish.

Cape May, Middlesex (Perth Amboy) and Monmouth Counties.

Trachinotus falcatus (Linnæus). Round Pampano.

Atlantic, Cape May (Ocean City) and Monmouth Counties.

Trachinotus carolinus (Linnæus). Pampano.

Atlantic, Cape May and Monmouth Counties.

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[1] *Naucrates ductor*, once recorded from Beesley's Point by Abbott, has not since been noticed in New Jersey, though as it may have been confused with *Seriola* is omitted.

[2] As *Trachurops crumenophthalmus* in Proc. Acad. Nat. Sci. Phila., 1862, p. 433.

[3] As *Caranx* by Brevoort, Forest and Stream, IX, November 29, 1977, p. 326.

POMATOMIDÆ.[1]

Pomatomus saltatrix (Linnæus). Blue Fish.

Atlantic (Absecon, Brigantine, Somers Point), Bergen (Hudson River), Burlington, Cape May (Anglesea, Delaware Bay, Dias Creek, Grassy Sound, Great Egg Harbor Bay), Cumberland (Bay Side), Hoboken, Mercer, Monmouth, Ocean (Barnegat, Barnegat Inlet, Beach Haven, Seaside Park, Spray Beach), Salem (Oldman's Creek) Counties.

RACHYCENTRIDÆ.

Rachycentron canadum (Linnæus). Sergeant Fish.

Atlantic, Cape May (Delaware Bay) and Monmouth Counties.

STROMATEIDÆ.

Poronotus triacanthus (Peck). Butter Fish.

Atlantic, Cape May and Monmouth (Long Branch) Counties.

Palinurichthys perciformis (Mitchill). Black Rudder Fish.

Atlantic, Cape May, Monmouth (Shrewsbury River) and Ocean Counties.

CORYPHÆNIDÆ.

Coryphaena hippurus Linnæus. Dolphin.

Atlantic (an old example received from Atlantic City in 1875), Cape May, Monmouth, Ocean (Beach Haven and Seaside Park) Counties.

MICROPTERIDÆ.

Acantharchus pomotis (Baird). Mud Sunfish.

Atlantic, Bergen (Oakland), Burlington, Camden, Cape May, Essex, Gloucester, Mercer, Morris and Salem Counties. This species was first discovered by T. A. Conrad, some years before Baird described it, and several fine examples were later (1860) sent to the Academy, where they are now in good condition. Slack also sent material the following year from Oakwood.

Enneacanthus obesus (Girard). Sphagnum Sunfish.

Atlantic, Bergen, Camden, Cape May and Gloucester Counties.

Enneacanthus gloriosus (Holbrook). Blue-spotted Sunfish.

Atlantic, Burlington, Camden, Cape May, Gloucester, Mercer, Morris, Salem and Sussex Counties.

Mesogonistius chaetodon (Baird). Banded Sunfish.

Atlantic, Burlington, Camden, Cape May, Mercer and Salem Counties.

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[1] *Chloroscombrus chrysurus* and *Peprilus longimanus* (=*Seserinus paru*) are recorded from "our waters" and the "coast" in 1868, by Abbott. As these records are very indefinite they may be dropped. Likewise the record of *Lampugus punctulatus* (=*Coryphaena equiselis* Linnæus), in Forest and Stream, V, September 16, 1878, p. 83, from off Sandy Hook

Lepomis auritus (Linnæus). Red-bellied Sunfish.

Bergen, Burlington, Cape May, Essex, Gloucester, Mercer, Morris, Passaic, Sussex and Warren Counties.

Pomotis gibbosus (Linnæus). Common Sunfish.

Bergen, Burlington, Camden (Newton Creek, Pensauken), Cape May, Cumberland, Essex, Gloucester (Sewell), Hunterdon (Croton Lake), Mercer, Monmouth (Deal Lake), Morris (Succasunna and upper Longwood Reservoir), Passaic, Somerset, Salem, Sussex and Warren Counties.

PERCIDÆ.[1]

Perca flavescens (Mitchill). Yellow Perch.

Bergen (Passaic River, Vreeland's Pond), Burlington (Rancocas Creek at Delanco), Camden (Blackwood Pond, Newton Creek, Pensauken), Cape May, Cumberland (Bridgeton), Essex (Newark), Gloucester (Timber Creek), Hunterdon (Croton Lake), Mercer, Monmouth (Asbury Park), Morris (Budd Lake, Succasunna, upper Longwood Reservoir), Ocean (Metedecong River), Passaic (Greenwood Lake), Salem, Somerset (Bound Brook), Sussex (Culver's Lake) Counties.

Boleosoma olmstedi (Storer). Tessellated Darter.

Atlantic, Burlington (Pemberton), Cape May, Essex, Gloucester (Woodbury), Hunterdon, Mercer and Salem Counties.

Boleichthys fusiformis (Girard). Lowland Darter.

Atlantic (Batsto River), Burlington, Cape May (Cape May), Mercer and Somerset Counties.

SERRANIDÆ.[2]

Roccus lineatus (Bloch). Striped Bass.

Atlantic (Nancock Creek), Bergen (Hackensack River), Burlington (Dutch Neck fishery), Camden, Cape May (Anglesea, Cold Spring Inlet, Dias Creek, Fishing Creek, Middle Thoroughfare, Petersburg Bridge), Cumberland (Bay Side, Bridgeton, Fortescue, Port Elizabeth, Sea Breeze), Essex (Bayonne, Newark Bay, Passaic River formerly), Gloucester, Hoboken, Hunterdon, Mercer, Middlesex (Cheesequake Creek, Perth Amboy, Sewaren, South Amboy), Monmouth (Allenhurst, Atlantic Highlands, Avon, Belford, Belmar, Deal Beach, Elberton, Fairhaven, Highland Beach, Manasquan, Matawan Creek, Monmouth Beach, Ocean Grove, Oceanic, Port Monmouth, Red Bank, Sandy Hook, Seabright, Shrewsbury River, Stump Creek), Ocean (Barnegat Inlet, Beach Haven, Forked River, Harvey Cedars, Metedecong River, Mullica River, Point Pleasant, Seaside Park, Toms River, Tuckerton, Waretown), Salem (Oakwood Beach, Pedricktown, Pennsville), Union (Elizabeth and Kill Von Kull) Counties.

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[1] *Percina caprodes* is recorded from the Delaware at Trenton, by Abbott in 1868, and may have been introduced. Likewise the record for *Paecilichthys flabellaris* by Eugene Smith, from the Hackensack River in 1897.

[2] *Duleichthys auriga* reported from Cape May by Abbott, is likely a confused identification. Possibly De Kay's New York harbor record is really intended.

Morone americana (Gmelin). White Perch.

Atlantic (Little Egg Harbor River and Nancock Creek), Bergen (Hackensack and Hudson Rivers), Burlington (Beverly, Delanco, Dutch Neck fishery, Pensauken Creek, Riverton), Camden (Camden, Gloucester), Cape May (Cedar Hammocks, Cold Spring Inlet, Dennis Creek, Dias Creek, Stone Harbor), Cumberland (Bay Side, Fortescue, Sea Breeze), Essex (Newark Bay, Passaic River), Gloucester, Hunterdon, Mercer (Bordentown, Carnegie Lake at Princeton, Duck Island, Washington Crossing), Middlesex (Perth Amboy), Monmouth (Asbury Park, Belmar, Deal Lake, Lake Como, Manasquan), Ocean (Barnegat Bay and Toms River), Salem (Pedricktown, Pennsville, Salem Creek) Counties.

Polyprion americanus (Schneider). Wreck Fish.

Recorded from off Asbury Park, from small example, by Osburn.[1]

Epinephelus niveatus (Valenciennes). Snowy Grouper.

Two small ones obtained at Sea Isle City and Corson's Inlet, both in 1915.

Epinephelus morio (Valenciennes). Red Grouper.

Reported from Beesley's Point by Abbott.[2]

Garrupa nigrita (Holbrook). Black Grouper.

Young example reported by Dr. R. J. Phillips at Corson's Inlet, September 2, 1909.

Centropristis striatus (Linnæus). Black Sea Bass.

Atlantic (Longport), Cape May (Cross Leger, Peck's Bay), Cumberland (Bay Side), Monmouth (Manasquan), Ocean (Beach Haven) Counties.

LOBOTIDÆ.

Lobotes surinamensis (Bloch). Triple-tail.

Cape May, Hudson and Monmouth Counties.

PRIACANTHIDÆ.

Pseudopriacanthus altus (Gill). Rough Catalufa.

Recorded from Atlantic City by Cope in 1870.

LUTJANIDÆ.

Lutjanus griseus (Linnæus). Gray Snapper.

Described by Baird from Beesley's Point as *Lobotes emarginatus*.[3] No recent example secured.

Lutjanus aya (Bloch). Red Snapper.

Dr. H. M. Smith records several small ones at Spring Lake, in Monmouth County, in 1892.

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[1] Bull. Z. Soc. N. Y., No. 42, November, 1910, p. 705.

[2] Geol. N. J., 1868, p. 806.

[3] Ninth An. Rep. Smiths. Inst., 1854 (1855), p. (18) 332.

Ocyurus chrysurus (Bloch). Yellow-tail.

One obtained at Anglesea in 1890.[1]

HÆMULIDÆ.[2]

Orthopristis chrysopterus (Linnæus). Pig Fish.

Atlantic, Cape May (Delaware Bay) and Monmouth (Sandy Hook) Counties.

SPARIDÆ.

Stenotomus chrysops (Linnæus). Porgy.

Atlantic, Cape May (Peck's Bay and Townsend's Inlet), Cumberland (Bay Side), Monmouth (Long Branch) and Ocean (Tuckerton) Counties.

Lagodon rhomboides (Linnæus). Sailor's Choice.

Atlantic, Cape May and Monmouth Counties.

Archosargus probatocephalus (Walbaum). Sheepshead.

Atlantic, Cape May, Cumberland (Bay Side), Monmouth and Ocean (Barnegat Inlet) Counties.

GERRIDÆ.

Eucinostomus gula (Cuvier). Mojarrita.

Atlantic, Cape May and Middlesex Counties.

SCIÆNIDÆ.

Cynoscion regalis (Schneider). Weak Fish.

Atlantic (Brigantine, Great Bay), Cape May (Cold Spring Inlet, Townsend's Inlet), Cumberland, Monmouth (Long Branch, Manasquan), Ocean (Barnegat Inlet), Salem (Oldman's Creek) Counties.

Cynoscion nebulosus (Cuvier). Spotted Weak Fish.

Atlantic, Cape May (Delaware Bay, Middle Thoroughfare, Ocean City) and Ocean Counties.

Bairdiella chrysura (Lacépède). Silver Perch.

Atlantic, Cape May (Tuckahoe River), Cumberland, Monmouth and Salem Counties.

Sciaenops ocellatus (Linnæus). Red Drum.

Atlantic, Cape May (Cold Spring Inlet, Town Bank), Cumberland (Bay Side), Monmouth, Ocean and Salem (mouth of Salem Creek) Counties.

Leiostomus xanthurus Lacépède. Goody.

Atlantic, Camden (Washington Park, on the Delaware), Cape May (Beesley's Point, Seven-mile Beach, Stone Harbor, Townsend's Inlet), Cumberland (Bay Side), Monmouth (Long Branch) and Ocean Counties.

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[1] Fowler, Copeia, April 16, 1915, No. 17.

[2] Abbott reports *Haemulon formosum* = *H. plumieri* (Lacépède), from Delaware Bay, a single specimen said to have been taken in July, 1867. He also lists *Anisotremus virginicus* from Barnegat, and then taken to the Trenton fish-market where he saw it. Both these species may be questioned from New Jersey.

Micropogon undulatus (Linnæus). Croaker.

Atlantic, Cape May, Cumberland (Bay Side, Cohansey Creek), Monmouth (Long Branch, Manasquan) and Ocean Counties.

Menticirrhus americanus (Linnæus). Carolina Whiting.

Atlantic and Cape May (Ocean City) Counties.

Menticirrhus saxatilis (Schneider). King Fish.

Atlantic, Cape May (Grassy Sound, Peck's Bay, Tuckahoe River), Cumberland (Bay Side, Fortescue), Monmouth (Manasquan) and Ocean (Barnegat Pier) Counties.

Pogonias cromis (Linnæus). Black Drum.

Atlantic, Cape May (Corson's Inlet, Dias Creek, Town Bank), Cumberland (Bay Side), Monmouth (Sandy Hook), Ocean (Beach Haven) and Salem Counties.

MULLIDÆ.

Mullus auratus (Jordan and Gilbert). Surmullet.

Recorded by Dr. T. H. Bean[1] from Sandy Hook and Dr. H. F. Moore[2] from Ludlam Bay.

Upeneus maculatus (Bloch). Goat Fish.

Recorded by the writer from Stone Harbor.[3]

Upeneus phillipsi Fowler. New Jersey Goat Fish.

Described, with the last, from Corson's Inlet. I have since seen another example from Ludlam Bay.

LABRIDÆ.

Tautogolabrus adspersus (Walbaum). Bergall.

Atlantic, Cape May (Cape May, Peck's Bay), Monmouth and Ocean Counties.

Tautoga onitis (Linnæus). Tautog.

Atlantic, Cape May (Anglesea, Cold Spring Inlet, Green Creek), Cumberland, Monmouth and Ocean Counties.

CALLYODONTIDÆ.

Cryptotomus beryllinus Jordan and Swain. Olive Parrot Fish.

Young example recorded by Jordan from Somer's Point.[4]

ILARCHIDÆ.

Chaetodipterus faber (Broussonet). Spade Fish.

Atlantic, Cape May (Holly Beach) and Monmouth Counties.

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[1] Bull. Amer. Mus. N. Hist. N. Y., IX, 1897, p. 359.
[2] Bull. U. S. F. Com., XII, 1892 (1894), p. 362.
[3] Occas. Pap. Mus. Zool. Univ. Mich., No. 56, May 6, 1918, p. 8.
[4] Rep. U. S. F. Comm., XV, 1887 (1891), p. 666.

CHÆTODONTIDÆ.

Chaetodon ocellatus Bloch. Ocellated Butterfly-fish.

Recorded by the late Dr. T. H. Bean from Beesley's Point.

Chaetodon striatus Linnæus. Streaked Butterfly-fish.

The admission of this species to our fauna is based on a specimen received at the Academy in 1830, from Delaware Bay, and obtained by Richard Harlan. This specimen is still in good condition.[1]

Pomacanthus arcuatus (Linnæus). Black Angel Fish.

Reported by Baird from Barnegat. Several examples have since been taken at Sea Isle City.

ACANTHURIDÆ.

Hepatus hepatus (Linnæus). Surgeon Fish.

Abbott reports in 1868 "a single specimen has been seen, taken at Tuckerton in 1860."

BALISTIDÆ.

Balistes carolinensis Gmelin. Trigger-fish.

Atlantic, Cape May, Cumberland (Bay Side), Monmouth and Ocean Counties.

Balistes vetula Linnæus. Blue-striped Trigger-fish.

Van Mater records it from Atlantic Highlands.[2]

MONACANTHIDÆ.

Stephanolepis hispidus (Linnæus). File-fish.

Atlantic, Cape May and Monmouth Counties.

Alutera schoepfii (Walbaum). Orange File-fish.

Atlantic, Cape May and Ocean Counties.

Alutera punctata Agassiz. Spotted File-fish.

Recorded from Corson's Inlet.[3]

OSTRACIIDÆ.

Lactophrys triqueter (Linnæus). Three-angled Trunk-fish.

Recorded from Grassy Sound on young example sent to the writer.[4]

Lactophrys trigonus (Linnæus). Trunk-fish.

Recorded from Atlantic City as *Tetrasomus camelinus* by Abbott.[5] No examples obtained by me through one reported from Cape May.

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[1] Quite likely the reference to *Holacanthus ciliaris* Abbott, Geol. N. J., 1868, p. 811, also credited to Delaware Bay, may have been confused with the Streaked Butterfly-fish.

[2] Bull. U. S. F. Com., IV, 1884, p. 13.

[3] Proc. Acad. Nat. Sci. Phila., 1917, p. 113.

[4] Science, XXIX, January 8, 1909, p. 79.

[5] Geol. N. J., 1868, p. 827.

TETRODONTIDÆ.

Lagocephalus laevigatus (Linnæus). Rabbit-fish.

Atlantic, Cape May, Cumberland, Monmouth and Ocean (Barnegat Bay) Counties.

Spheroides maculatus (Schneider). Puffer.

Atlantic, Cumberland (Bay Side), Cape May (Avalon, Dias Creek), Monmouth and Ocean (Beach Haven) Counties.

Spheroides testudineus (Linnæus). Southern Puffer.

Reported from Beesley's Point by the writer.[1]

DIODONTIDÆ.

Diodon hystrix Linnæus. Porcupine Fish.

Young recorded from Atlantic City by the writer.[2] The reference to *D. pilosus* by Abbott[3] from the Hudson, is evidently from De Kay.

Chilomycterus atinga (Linnæus). Atinga.

Fine adult example recorded from Ocean City by the writer.[4]

Chilomycterus schoepfi (Walbaum). Burr Fish.

Atlantic, Cape May and Monmouth (Long Branch) Counties.

MOLIDÆ.

Mola mola (Linnæus). Head Fish.

Atlantic, Cape May, Monmouth and Ocean Counties.

SCORPÆNIDÆ.

Sebastes marinus (Linnæus). Rose Fish.

Recorded by Abbott on specimen taken in August 1865, off Sandy Hook.

TRIGLIDÆ.

Prionotus carolinus (Linnæus). Short-finned Gurnard.

Atlantic, Cape May (Anglesea) and Monmouth Counties.

Prionotus evolans strigatus (Cuvier). Long-finned Gurnard.

Atlantic, Cape May and Monmouth Counties.

COTTIDÆ.

Cottus gracilis Heckel. Fresh-water Sculpin.

Warren County. Eugene Smith reported it from the Hackensack and Saddle Rivers, but without definite localities.[5] The example I reported from "Beesley's Point" may have been obtained in northern New Jersey.[6]

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[1] Rep. N. J. State Mus., 1907 (1908), p. 182.
[2] Proc. Acad. Nat. Sci. Phila., 1917, p. 114.
[3] Geol. N. J., 1868, p. 827.
[4] Proc. Acad. Nat. Sci. Phila., 1919 (1920), p. 297.
[5] Proc. Linn. Soc. N. Y., No. 9, 1897, p. 40.
[6] Rep. N. J. State Mus., 1905 (1906), p. 372.

Myoxocephalus aeneus (Mitchill). Little Sculpin.

Atlantic, Cape May and Monmouth Counties.

Myoxocephalus octodecimspinosus (Mitchill). Long-spined Sculpin.

Atlantic, Cape May and Monmouth Counties.

Hemitripterus americanus (Gmelin). Sea Raven.

Cape May and Monmouth Counties.

CYCLOPTERIDÆ.[1]

Cyclopterus lumpus Linnæus. Lump fish.

Atlantic, Cape May (Sea Isle City) and Monmouth Counties.

DACTYLOPTERIDÆ.

Cephalacanthus volitans (Linnæus). Flying Gurnard.

A few records in Cape May County.

ECHENEIDIDÆ.

Leptecheneis naucrates (Linnæus). Slender Remora.

Cape May (Cape May, Corson's Inlet), Monmouth (Long Branch, one received by the Academy in 1844), Ocean (Bay Head) Counties.

The examples mentioned from the Delaware River by Abbott[2] were taken from the bottom of a vessel that came up the river to Philadelphia, about 1861, and are in no sense to be considered New Jersey specimens.

Echeneis remora Linnæus. Remora.

Listed as simply from New Jersey by Abbott in 1868. No examples obtained by me, though reported from a large shark taken in Peck's Bay about ten years ago.

BOTHIDÆ.

Lophopsetta maculata (Mitchill). Window Pane.

Atlantic, Cape May (Dias and Fishing Creeks, Peck's Bay) Counties.

Citharichthys micros Fowler. Least Whiff.

Described from Corson's Inlet.[3]

Citharichthys spilopterus Günther. Speckled Whiff.

Reported by Jordan and Goss "north to New Jersey."[4]

Etropus microstomus (Gill). Little Flounder.

Atlantic and Cape May Counties. Described from Beesley's Point as *Citharichthys microstomus* Gill.[5]

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[1] Abbott records *Aspidophoroides monopterygius* on a single example from off Sandy Hook, taken in the summer of 1864. See Geol. N. J., 1868, p. 816.

[2] *Echeneis albacauda* in Geol. N. J., 1868, p. 818.

[3] Proc. Acad. Nat. Sci. Phila., 1911, p. 200, figs.

[4] Rep. U. S. F. Com., 1885 (1889), p. 276.

[5] Proc. Acad. Nat. Sci. Phila., 1864, p. 223.

Paralichthys dentatus (Linnæus). Summer Flounder.

Atlantic (Absecon), Cape May (Cold Spring Inlet, Fishing Creek, Peck's Bay, Townsend's Inlet), Cumberland (Bay Side), Monmouth (Manasquan) and Ocean Counties.

PLEURONECTIDÆ.

Hippoglossus hippoglossus (Linnæus). Halibut.

Monmouth County. First recorded by Mitchill from off Sandy Hook.[1]

Limanda ferruginea (Storer). Fluke.

Once found at Sewell's Point, Cape May.[2]

Pseudopleuronectes americanus (Walbaum). Winter Flounder.

Atlantic, Cape May (Peck's Bay, Sea Isle City), Middlesex (Raritan Bay), Monmouth and Ocean Counties.

SOLEIDÆ.

Achirus fasciatus Lacépède. Sole.

Atlantic, Bergen, Burlington, Cape May (Dias Creek), Cumberland (Bay Side), Mercer, Monmouth and Salem Counties.

GOBIIDÆ.

Gobiosoma bosc (Lacépède). Naked Goby.

Atlantic and Cape May (Beesley's Point) Counties.

URANOSCOPIDÆ.

Astroscopus guttatus Abbott. Star Gazer.

Atlantic, Cape May and Monmouth Counties.

BATRACHOIDIDÆ.

Opsanus tau (Linnæus). Toad Fish.

Atlantic, Cape May (Grassy Sound), Cumberland (Bay Side), Monmouth and Ocean (Barnegat Pier) Counties. Described as *Batrachoides variegatus* by Le Sueur, from Egg Harbor, in 1823.

BLENNIIDÆ.

Blennius foxi Fowler.

Described from Sea Isle City by the writer.[3]

Hypsoblennius hentz (Le Sueur). Shell Blenny.

The occurrence of this species is based on an example in the Academy, labeled "Beesley's Point," received from Samuel Ashmead.[4]

Also another example in the collection, from Cape May, but without

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[1] As *Pleuronectes hippoglossus*, in Trans. Lit. Philos. Soc. N. Y., I, 1815, p. 386.

[2] Fowler, Science, XXIV, November 9, 1906, p. 596.

[3] Proc. Acad. Nat. Sci. Phila., 1914, p. 344, fig. *B. fucorum* is mentioned by Abbott in 1868, doubtless with De Kay in mind.

[4] *Hypleurochilus geminatus* (non Wood) Fowler, Rep. N. J. State Mus., 1905 (1906) p. 403.

further data. It may be one of two examples mentioned in an old donation to the museum.[1] Possibly the other example is *Chasmodes bosquianus*. The above information therefore adds another interesting southern species to the New Jersey fauna.

Chasmodes bosquianus (Lacépède). Large-mouthed Blenny.

Not previously reported from New Jersey, though several examples without further locality have been examined and compared in this connection. Some time ago I wrongly identified a fine fresh example,[2] received in an empty oyster-shell from Virginia. Often small fish brought to our markets in oyster-shells, or among oyster clusters, are found to be this species, others young toad fishes.

LYCODIDÆ.[3]

Enchelyopus anguillaris (Peck). Eel-pout.

Atlantic, Cape May and Monmouth Counties.

OPHIDIIDÆ.

Rissola marginata (De Kay). Sand Cusk.

Atlantic, Cape May and Monmouth Counties.

AMMODYTIDÆ.

Ammodytes americanus De Kay. Sand Lance.

Atlantic (Atlantic City), Cape May (Cold Spring Inlet) and Monmouth (Asbury Park) Counties.

GADIDÆ.

Pollachius virens (Linnæus). Pollack.

Atlantic, Cape May and Monmouth Counties.

Microgadus tomcod (Walbaum).[4] Tom-cod.

Gadus callarias Linnæus. Cod-fish.

Atlantic, Cape May (Corson's Inlet, Five Fathom Bank, McCrie's Shoal), Monmouth (Manasquan) and Ocean Counties.

Melanogrammus aeglefinus (Linnæus). Haddock.

Cape May, Monmouth and Ocean Counties.

Phycis regius (Walbaum). Spotted Codling.

Atlantic, Cape May and Monmouth Counties.

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[1] *Blennius punctatus* (non Fabricius), in Proc. Acad. Nat. Sci. Phila., IV, 1849, p. 163.

[2] As *Hypleurochilus geminatus*, in Rep. N. J. State Mus., 1906 (1907), p. 343, pl. 115.

[3] Doubtful records are *Anarhichas lupus* and *Muraenoides mucronatus* = *Pholis gunnellus*, both given by Abbott in 1868.

[4] Abbott records *Brosmius brosme* in 1868 on two examples from Cape May, likely an erroneous identification. It is quite possible these specimens were really those listed in the additions to the museum of the Academy as *Morrhua pruinosa*, in Proc. Acad. Nat. Sci. Phila., XII, 1860, p. V, obtained at Beesley's Point by Samuel Ashmead.

Phycis tenuis (Mitchill). Slender Ling.

Atlantic, Cape May and Monmouth Counties.

Phycis chuss (Walbaum). Ling.

Atlantic, Cape May and Monmouth Counties.

MERLUCCIIDÆ.

Merluccius bilinearis (Mitchill). Hake.

Atlantic, Cape May (Corson's Inlet, Holly Beach), Monmouth (Manasquan) and Ocean (Long Beach) Counties.

LOPHIIDÆ.

Lophius piscatorius Linnæus. Angler.

Atlantic, Cape May (Ocean City, Town Bank, Townsend's Inlet), Cumberland (Bay Side) and Monmouth Counties.

ANTENNARIIDÆ.

Histrio histrio (Linnæus). Sargassum Fish.

Reported from Beesley's Point by Abbott, in 1868.

Antennarius scaber (Cuvier). Frog Fish.

Described as *A. teleplanus* Fowler, from Corson's Inlet. Compared with examples from the West Indies and tropical America, the above example only differs in a few minor details, which are not specific.

INTRODUCED SPECIES.

AMIATIDÆ.

Amiatus calvus (Linnæus). Bowfin.

Camden County.

SALMONIDÆ.

Oncorhynchus tschawytscha (Walbaum). Quinnat Salmon.

Delaware and Raritan Rivers. Unsuccessful.

Salmo salar Linnæus. Salmon.

Burlington (Bordentown), Cape May, Cumberland and Warren Counties. Delaware, Raritan and Passaic Rivers. Unsuccessful.[1]

Salmo salar sebago (Girard). Landlocked Salmon.

Northern Lakes of New Jersey.

Salmo fario Linnæus. Brown Trout.

Salem County.

Salmo irideus Gibbons.

Passaic County.[2]

Cristivomer namaycush (Walbaum). Great Lake Trout.

Warren County.[3]

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[1] Slack, Fourth An. Rep. C. Fisher. N. J., 1873, p. 23.

[2] Schiper, Forest and Stream, XXII, 1884, p. 368

[3] Slack, Fourth An. Rep. C. Fisher. N. J., 1873, p. 26.

Salvelinus alpinus (Linnæus). Charr.

Stirling Lake.[1]

ICTALURIDÆ.

Ictalurus furcatus (Valenciennes). Chuckle-head Cat.

Morris and Passaic Counties.

Ictalurus punctatus (Rafinesque). Spotted Cat.

Mercer County.

CYPRINIDÆ.

Cyprinus carpio Linnæus. Carp.

Burlington, Cape May, Mercer and Passaic Counties.

Carassius auratus (Linnæus). Goldfish.

Bergen, Camden and Mercer Counties. Introduced and escaped from ponds.

ESOCIDÆ.

Esox masquinongy Mitchill. Muskallunge.

Passaic County.

MICROPTERIDÆ.

Pomoxis annularis Rafinesque. Crappie.

Delaware River.

Pomoxis sparoides (Lacépède). Calico Bass.

Burlington (Burlington), Camden (Haddonfield), Mercer, Morris and Salem Counties.

Ambloplites rupestris (Rafinesque). Red-eyed Bass.

Mercer, Morris, Passaic and Salem Counties.

Lepomis incisor Valenciennes. Blue Sunfish.

Burlington (Riverton), Camden, Mercer and Sussex Counties.

Micropterus dolomieu Lacépède. Small-mouth Bass.

Bergen (Hackensack, Mahwah, Ramapo River), Burlington (Delanco), Camden (Blackwood), Cape May, Essex (Newark), Hunterdon (Croton, Delaware River, Lambertville), Mercer (Trenton), Middlesex (Cranberry), Monmouth (Asbury Park, Red Bank), Morris (Brookdale, Green Pond, Milton Lake, Rockaway, Splitrock Pond, Two Bridges, Whippany), Ocean (Metedecong River), Passaic (Echo Lake, Little Falls, Passaic, Paterson, Pompton), Somerset (Bound Brook, East Millstone, Raritan River, Somerville), Sussex (Budd Lake, Culver Lake, Delaware River, Franklin, Long Lake, Newton, Panther Lake, Swartzwood Lake, Waterloo), Warren (Allamuchy Pond, Belvidere, Decker Pond, Delaware River, Hackettstown, Phillipsburg) Counties.

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[1] T. H. Bean, Seventh An. Rep. Fish. Game Com. N. Y., 1901, p. 347.

Microptreus salmoides (Lacépède). Large-mouth Bass.

Camden, Cumberland (Bridgeton), Gloucester (Gloucester, Swedesboro, Wenonah), Hunterdon (Lambertville), Middlesex (Metuchen), Morris (Boonton, Budd Lake), Passaic (Greenwood Lake, Patterson, Vreeland's Pond), Salem, Sussex, Warren and Union (Scotch Plains) Counties.

PERCIDÆ.

Stizostedion vitreum (Mitchill). Pike Perch.

Morris and Passaic Counties. Delaware and Raritan Rivers.

SERRANIDÆ.

Roccus chrysops (Rafinesque). White Bass.

Passaic County.

GADIDÆ.

Lota maculosa (Le Sueur). Burbot.

Recorded from the Delaware River at Burlington Island, by Abbott.[1]

[1] Nat. Rambles, 1885, p. 478.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

CERCOPIDAE OF THE VICINITY OF WASHINGTON, D. C., WITH DESCRIPTIONS OF NEW VARIETIES OF CLASTOPTERA (Homoptera).

BY W. L. McATEE.

The basic identifications upon which this paper is based were made by Mr. Edmund H. Gibson, when he and the writer planned a joint essay on all the Nearctic Cercopidæ available in Washington collections. That plan becoming impracticable, due to Mr. Gibson's change of occupation, opportunity is taken to list the Cercopid fauna of the District of Columbia and vicinity. The manuscript of the paper has been prepared, in its entirety, by the author, this including preparation of the keys and more or less revision of the local forms of the genus *Clastoptera*. Mr. Gibson, however, deserves credit for recognizing that the black variety of *C. proteus* lacks a name and the name given to it on a subsequent page should be considered of his authorship.

The number of species of Cercopidæ in the United States is small and the District of Columbia apparently has a fair share; possibly one or two more species than here listed may occur. The occurrence of species at Plummers Id., Md., and vicinity is indicated in the list, either by the actual locality records or by the initials: P. I. and V. P. I.

KEY TO THE GENERA.

A. Anterior margin of pronotum straight; front strongly swollen, with a prominent median carina; tegmina dark with two yellow to orange-red crossbands. *Tomaspis.*

AA. Anterior margin of pronotum rounded or angular; insects lacking, also, the combination of characters of the preceding genus.

B. Tegmen with a membranous portion beyond veins, strongly deflexed posteriorly, apex of clavus broadly rounded. *Clastoptera.*

BB. Tegmen without membranous portion beyond veins; apex of clavus acute.

C. Margin of vertex above antenna compressed to a thin edge.

D. Front swollen; apices of tegmina rounded; pronotum more or less carinate on median line; ocelli nearer each other than to eyes; beak surpassing hind coxae. *Aphrophora.*

DD. Front scarcely swollen; apices of tegmina angulate; pronotum slightly sulcate medianly; ocelli about equally distant from eyes and from each other; beak reaching middle coxae. *Lepyronia.*

CC. Margin of vertex above antenna truncate or even sulcate. *Philaenus.*[1]

Tomaspis Stål.

T. bicincta Say.—Frequent, but by no means common; dates of collection range from June 28 to August 17; P. I.

Aphrophora Germar.

KEY TO THE SPECIES.

A. Costal region of tegmen with two large hyaline areas. *quadrinotata.*

AA. Costal region without large definite hyaline areas.

B. Front more swollen, produced as far if not slightly farther forward, than anterior margin of vertex; larger species, brown color rather uniformly distributed. *parallela.*

BB. Front less swollen, retreating at an acute angle from anterior margin of vertex; smaller species, color more obviously distributed into darker and paler areas. *saratogensis.*

A. quadrinotata Say.—Fairly common; extreme dates of collection June 6 to August 12; P. I.

A. parallela Say.—Fairly common; has been collected from June 7 to August 14; food plant *Pinus virginiana;* V. P. I.

A. saratogensis Fitch.—Common on *Pinus virginiana,* June 4 to October 11; V. P. I.

Lepyronia Amyot and Serville.

KEY TO THE SPECIES.

A. Larger species, general color pale brown, a dark V-shaped marking, based on costa, on each tegmen. *quadrangularis.*

AA. Smaller species, general color dark brown, tegmina rather closely reticulated with dark markings, except on posterior third. *angulifera.*

[1] Has been taken as far south as North Carolina and may be found here.

L. quadrangularis Say.—Common; dates of collection range from June 15 to October 5; P. I.

L. angulifera Uhler.—The only record for this southern Coastal Plain species is Four-mile Run, Va., May 31, 1914, W. L. McAtee.

Clastoptera Germar.

The classification and nomenclature of this genus is much in need of revision. The principal basis for the existing conception of the group is Dr. E. D. Ball's 1895 paper.[1] This essay was prepared at a time when the proper differentiation of subspecies and varieties was of no moment among entomologists and when the niceties of nomenclature, also, were little observed. No one is more aware of its faults than its author and it is to be hoped Dr. Ball can find time to give us a revised classification not only of this genus but of the whole family. In the present paper, therefore, only such changes are made as seem necessary to rational treatment of the local species.

These changes relate to the following forms:

Clastoptera proteus var *nigra* Ball.[2] Van Duzee has pointed out that this name is preoccupied by *C. nigra* Germar, and synonymizes it with *C. pini* Fitch.[3] However, our specimens which have been examined by Dr. Ball and pronounced his var. *nigra* certainly are not *pini* Fitch (our identification verified by Ball), but a distinct variety, if not species, which is here given a new name.

Clastoptera xanthocephala var. *glauca* Heidemann. According to Article 25*a* of the International Rules of Zoological Nomenclature (further construed in Opinion 1) and previously long accepted practise among zoologists, the name *glauca* as used by Heidemann[4] cannot be considered a *nomen nudum* as done by Van Duzee,[5] because it is accompanied by an illustration. The glaucousness referred to by Ball and subsequent describers is only an effect produced by the pallor and reflections from the polished surface, which latter character is common also to the dark variety. The real distinction of var. *glauca* is the pale color.

Clastoptera pini Fitch. Ball classed this form with *obtusa* and Van Duzee treats it as a variety of *proteus*, but to the writer it seems a distinct species, characterized by the less inflated face which is always pale, the more bluntly rounded vertex, and by the more numerous transverse wrinkles on the pronotum.

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[1] A Study of the Genus Clastoptera, Proc. Iowa Ac. Sci. (1895), 1896, pp. 182–193, pls. 11–14.

[2] Op. cit., p. 187.

[3] Bul. Buffalo Soc. Nat. Sci., Vol. 10, 1912, p. 509; Catalogue of Hemiptera of America, 1917, p. 520.

[4] Proc. Ent. Soc. Wash., Vol. IV, No. 4, pp. 399–402, pl. 6.

[5] Catalogue, 1917, p. 519.

KEY TO THE SPECIES.

A. Front more inflated; upper half of front black, loræ, clypeus and lower half of front yellow; pronotum with fewer transverse wrinkles. *proteus.*

AA. Front less inflated; upper half of front pale, or with transverse band or bands, sometimes interrupted; pronotum with more numerous transverse wrinkles.

B. Lower part of face with a dark, transverse band; front margin of vertex more produced and more strongly arcuate.

C. Larger species; a prominent transverse arcuate carina on vertex between eyes. *obtusa.*

CC. Smaller species; without such carina. *xanthocephala.*

BB. Face entirely pale, vertex less produced, front margin bluntly rounded. *pini.*

C. proteus Fitch.

KEY TO THE COLOR VARIETIES.

A. Black above.

B. Uniformly black above; legs chiefly dark. **hyperici,** n. var.

BB. Membrane and adjacent parts of tegmina paler; legs chiefly yellow. **anceps,** n. var.

AA. Not black above.

C. Clavus yellow with a lengthwise dark streak. *vittata.*

CC. Clavus colored otherwise.

D. Anterior two-thirds of clavus, base of scutellum and cross-bands on pronotum and head yellow. *proteus.*

DD. These markings orange-red. **candens,** n. var.

Clastoptera proteus var. **hyperici,** n. var. Gibson. Agreeing with *proteus* var. *proteus* in inflation of face, shape of vertex, striæ of pronotum and genitalia, but entirely black above and below, also, with the exceptions of lower part of face, clypeus, most of pectus, posterior two pairs of coxæ, two spots, or an interrupted stripe on lower surface of each of the anterior two pairs of tibiæ, a spot on anterior surface, near apex of each femur, the front pair sometimes excepted, apices of hind tibiæ except spurs, and hind tarsi, except spurs and last joint, pale yellow. Length, 2.5–3.5 mm.

Type, a male, Plummers Island, Md., July 5, 1914, on *Hypericum prolificum,* W. L. McAtee, Allotype, same data. Paratypes, same data, also same data except as to dates, July 14 and 26, 1914, and same locality, August 11, 1907, W. L. McAtee.

This variety has been seen also at Great Falls and at Occoquan, Va., in each case upon the same food plant being most abundant during the flowering season.

Clastoptera proteus var. **anceps,** n. var.—Black above, tegmina posterior of apical callous yellowish hyaline, explanate margin anterior of middle of costa sometimes same color; costal margin just anterior of apical callous clear hyaline; black below, except lower part of face, clypeus beak, most of pectus, and legs which are pale yellow with the following parts dark; an elliptical spot on clypeus, tip of beak, lengthwise streaks on anterior two pairs of femora, and tibiæ and tarsi except the hind ones, of which the spines and terminal joints are dark. Length, 2.75–3.25 mm.

Type, a male, Beltsville, Md., June 14, 1914, W. L. McAtee. Paratypes, with same data, also same locality, July 4, 1915, W. L. McAtee, and Cranberry Lake, N. Y., August 5, 1917, C. J. Drake.

Clastoptera proteus var. *vittata* Ball.—Plummers Id., Md., July 1907, W. Palmer; Beltsville, Md., July 4, 1915, on *Azalea,* Odenton, Md., July 4, 1913, W. L. McAtee; New Alexandria, Va., July, 1907, W. Palmer.

Clastoptera proteus var. *proteus* Fitch.—Plummers Id., Md., July 6, H. S. Barber, July 7, R. P. Currie, August 17, 1906, E. A. Schwarz and H. S. Barber, July 4, 1907, Mt. Vernon, Va., June 27, 1905, on *Cornus,* W. L. McAtee; Eastern Branch, near Benning, D. C., July 4, 1913, A. Wetmore.

Clastoptera proteus var. **candens,** n. var.—Like var. *proteus* except that anterior two-thirds of clavus, scutellum, bands on pronotum and vertex and face are orange-red, instead of yellow, and other pale markings are ruddy tinged. Length, 3.25–4 mm.

Type, a female, Mt. Vernon, Va., June 27, 1915, on *Cornus,* W. L. McAtee. Two paratypes, same data.

The high color of these specimens is not due to the influence of cyanide, in the killing bottle, such as is sometimes observed in specimens of bees of the genus *Nomada* and certain other insects, but was noted at the time of collection. Certain animal pigments seem to be quite unstable and the yellow of *Clastoptera proteus* may be another instance. Crawfishes turn red after cooking, digestion in a bird's stomach, or weathering after death; and one of the species of southern range (*Cambarus clarkii*) is bright red in life. Some of the Eumenidæ having yellow markings in the north are red-patterned in the south. It would appear, therefore, that climatic factors affect certain pigments of living animals in the same way that chemical processes are known to affect them in the dead. The present newly described variety of *C. proteus* may be an example of such effect.

C. obtusa Say.

KEY TO THE VARIETIES.

A. Scutellum and parts anterior, yellow to fulvous, without crossbands; tegmina fuscous posteriorly. . *achatina.*

AA. Vertex and pronotum with distinct crossbands.

B. Crossbands on pronotum, or at least the posterior, dark, in great contrast to the pale ground color; tegmina dark, each with an irregular, oblique, pale crossband. *tristis.*

BB. Markings of dorsal surface less contrasted. *obtusa.*

Clastoptera obtusa var. *achatina* Germar.—Forest Glen, Md., September 15, 1915, Otto Heidemann; Plummers Id., Md., August 27, 1905, September 13, 1914; Stubblefield Fall, Va., July 4, 1918, on hickory; Mt. Vernon, Va., June 27, 1915, W. L. McAtee.

Clastoptera obtusa var. *obtusa* Say.—Common, dates of collection ranging from June 13 to November 3; has been taken on *Alnus rugosa* and *Carpinus caroliniana.* P. I.

Clastoptera obtusa var. *tristis* Van Duzee.—Common, with the last, with which it extensively intergrades; extreme dates of collection, June 7 and November 21; has been taken on the same plants as var. *obtusa,* also on hickory. P. I.

C. xanthocephala Germar.

KEY TO THE VARIETIES.

A. Color above chiefly black. *xanthocephala.*

AA. Color above chiefly yellowish brown. *glauca.*

Clastoptera xanthocephala var. *xanthocephala* Germar.—Common, season June 29 to October 5. P. I.

Clastoptera xanthocephala var. *glauca* Heidemann.—Common, has been collected from January 2 to November 3; winters among the foliage of *Pinus virginiana.* P. I.

C. pini Fitch.—Beltsville, Md., June 14, 1914, W. L. McAtee; June 28, 1917, on flowers of *Xolisma ligustrina,* L. O. Jackson; Glencarlyn to Barcroft, Va., July 18, 1915, W. L. McAtee.

Vol. 33, pp. 177-180 December 30, 1920

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON COCKLEBURS (AMBROSIACEAE; XANTHIUM) OF THE DISTRICT OF COLUMBIA AND VICINITY.

BY W. L. McATEE AND F. P. METCALF.

Receipt of a copy of the "Revision of North American Species of Xanthium"[1] by Drs. Charles F. Millspaugh and Earl E. Sherff stimulated the writers to investigate the cocklebures of the District of Columbia and vicinity. Approximately 150 samples of mature burs were collected chiefly in December 1919. These were studied with the assistance of the revision just noted and reduced to a set of 24 samples illustrating the principal variations. These have been examined and commented upon by Dr. Earl E. Sherff whose kindness in this respect we gratefully acknowledge. Specimens already on hand in the National Herbarium also were taken into account and copious representations of the species here recorded have been deposited in that collection.

Cockleburs strongly specialized for casual transportation are typical waifs and reach all sorts of places where the wastes of civilization and nature accumulate. The search for cockleburs takes the collector to such interesting spots as refuse-heaps about freight-yards, factories and wharves, to ash, trash and garbage dumps and the environs of the barnyard, cattle-pens and pig-sties. Cockle-burs like ground not especially occupied with other plants. In eroded places, on grades, anywhere there is new-turned earth they may be found. They grow well among crops of rather open stand as corn

[1] Field Museum Publ. 204, Bot. Ser. Vol. 4, No. 2, April 1919, pp. 9–49, pls. 7–13.

and after harvest mature their fruits. They are formidable weeds found on every farm.

The classification of the species of *Xanthium* rests almost entirely on the characters of the fruits or burs. These, like most specific characters, are extremely variable, so that strict definition of the groups ranked as species may be quite difficult. After experience, however, the most dependable characters or combinations of characters are easily appreciated and identification is robbed of most of its perplexities. The subjoined key is based on the characters we have found most feasible for identifying the local cockleburs. The plate illustrating the burs we trust will be a useful adjunct to the key. For numerous other illustrations see Millspaugh and Sherff's "Revision."

The present contribution lists 5 species of Xanthium from the District of Columbia region, an increase of 2 over the number included in the recent "Flora."[1] *X. americanum* of that work is *X. chinense* Miller and *X. commune* no doubt covers both *X. italicum* Moretti and *X. pennsylvanicum* Wallroth as listed in the present paper.

KEY TO SPECIES

A. Burs with inconspicuous beaks; spines weak and curved like a button-hook at apex; color usually greenish yellow. *X. spinosum.*

AA. Burs with conspicuous beaks; spines strong, simply hooked; color usually reddish brown.

B. Body of fruit broadly oblong, oblong-ovoid or ovoid-oblong; spines densely hispid-pubescent, up to and beyond the middle.

C. Burs very large (2.8–4 cm. long and 2–3 cm. wide), broadly ovoid, oblong-ovoid or oval; spines stout, basal ones reflexed, thicker and longer than others and projecting much beyond stalk of bur. *X. speciosum.*

CC. Burs smaller (less than 2.8 cm. long and 2 cm. wide), oblong or ovoid-oblong, often widest at base; spines more slender, basal ones not reflexed or projecting much beyond stalk of bur. *X. italicum.*

BB. Body of fruit fusiform, ellipsoidal or narrowly oblong-ovoid; spines smooth, warty-glandular or if hispid usually only up to the middle.

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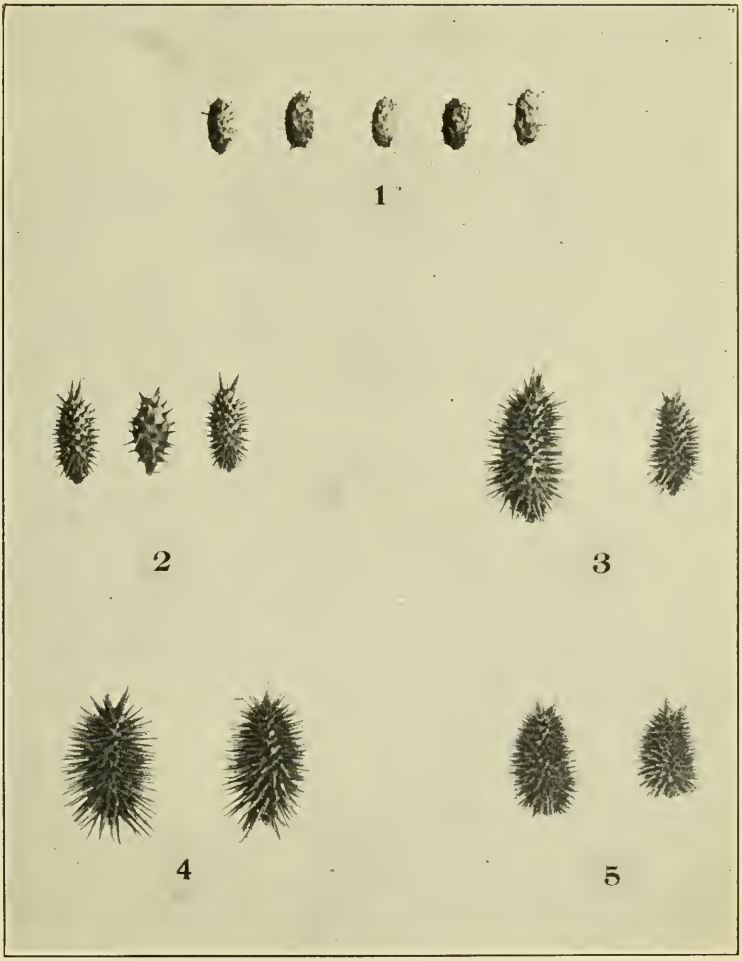
[1] Contr. Nat. Herb., Vol. 21, p. 267, Sept., 1919.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D. Body (0.9–2.5 cm. long—rarely over 2 cm.) narrowly fusiform or ellipsoidal, usually straight; surface of body smooth or warty-glandular; base of beaks and spines usually glandular-warty or rarely short-pubescent; beaks comparatively longer, more slender, usually straight and more or less divergent. *X. chinense.*

DD. Body (1–3.25 cm. long—often over 2.5 cm.) narrowly oblong-ovoid or ovoid-fusiform, often curved; surface of body pubescent, hispid or glandular pubescent; base of beaks and spines usually densely hispid-pubescent; beaks comparatively shorter, stouter especially at base and often incurved apically. *X. pennsylvanicum.*

Annotated List of Species.

Xanthium spinosum Linnæus.—Rather rare; apparently has been introduced several times, thrived for a season but failed to become permanently established; not recorded since 1896; has been collected near Alexandria, Va., in S. W. Washington and D. C. definite locality not given.

Xanthium chinense Miller.—Abundant in waste ground, cultivated fields and dumps throughout the District and vicinity. Collected near Benning Road, Navy Yard, Anacostia, War College, Water Street, near "I" S. W., Potomac Park, Lincoln Memorial, 29th and "K" streets, N. W., above Aqueduct Bridge, District Line near C. and O. Canal, also from Plummer's Island, Bladensburg and Laurel, Maryland, and Alexandria, Arlington Farm, Rosslyn, Chain Bridge and Cherrydale, Virginia.

Xanthium pennsylvanicum Wallroth.—Abundant in waste ground, cultivated fields and dumps throughout the District and vicinity. Collected near Benning Road, Southeast of Mt. Hamilton, Pennsylvania Avenue Bridge, S. E., Navy Yard, Anacostia, War College, Potomac Flats, Lincoln Memorial, Water Street, near "I" and 14th, S. W., and 33rd Streets, N. W., foot of 27th N. W., and Cleveland Park, also from Plummer's Island, Maryland, and Alexandria, Barcroft, Arlington Farm and Rosslyn, Virginia.

Xanthium italicum Moretti.—Frequent in waste ground. Collected from Benning Road, 19th and Mass. Ave., S. E., and Navy Yard, also Laurel, Maryland, and Alexandria, Arlington Farm and Aqueduct Bridge, Virginia.

Xanthium speciosum Kearney.—Rare, only a single, but very robust plant found in waste ground along Water Street about 33rd Street, N. W.

Explanation of Plate 4.

Fig. 1. *Xanthium spinosum.*
Fig. 2. *Xanthium chinense.*
Fig. 3. *Xanthium pennsylvanicum.*
Fig. 4. *Xanthium speciosum.*
Fig. 5. *Xanthium italicum.*

Figures slightly less than natural size.

Vol. 33, pp. 181-186 December 30, 1920

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

RECORDS OF SEVERAL RARE BIRDS FROM NEAR WASHINGTON, D. C.

Colymbus holboelli (Reinh.), *Holboell's Grebe.* A female was caught alive January 20, 1920, in Prince George Co., Md., just beyond the District Line by Mr. Lewis T. Miller. The specimen is now No. 256899, U. S. N. M.

Oceanites oceanicus (Kuhl), *Wilson's Petrel.*—A bird of this species secured June 27, 1914, was said to have been blown into a boat near Marshall Hall, Md., opposite Mt. Vernon. Mr. Edward S. Schmid, the Washington Taxidermist, received the bird alive, and gave it to Mr. Nelson R. Wood of the U. S. National Museum, who was able to keep it alive for about a week. He reports that the bird was unable to fly, ate only a little meat the first day or so, and was in poor condition. Now No. 236614, U. S. N. M. ♀?

Phalaropus fulicarius (Linn.), *Red Phalarope.*—An apparently unrecorded specimen of the Red Phalarope was received by the U. S. National Museum in the flesh. The bird is a male, secured on October 4, 1897, at White's Ferry, Potomac River, Montgomery Co., Md., by Edward Landvoigt. Now No. 161924, U. S. N. M.

Numenius americanus (Bechst.), *Long-billed Curlew.*—The U. S. National Museum has catalogued a ♀ of this species (No. 12624), that was received by the National Institute on April 11, 1842, and was secured by Mr. William Walker on the Potomac River. This specimen was transferred to the Smithsonian Institution from the Patent Office in 1858, and may be the bird referred to by Prof. W. W. Cooke as "Once taken on the Potomac River." (Proc. Biol. Soc. Wash., XXI, 1908, p. 116.)

Charadrius dominicus dominicus (Müller), *Golden Plover.*—A female was secured on March 28, 1911, on Nanjemoy Creek, Md., by Mr. John B. Peyton, No. 213276, U. S. N. M.

Coragyps urubu (Vieill.), *Black Vulture.*—Mr. William Palmer of the U. S. National Museum informs me that in 1918 he observed three of these birds. On August 5th he watched two that were circling over his house at Georgetown. On August 15th he observed a juvenile bird at Chesapeake Beach, Md. Dr. Paul Bartsch reported having recently seen a Black Vulture near Washington, but I have not the exact date. (Proc.

Biol. Soc. Wash., XXVII, 1914, p. 9.) On January 2, 1920, five birds were seen by Mr. H. S. Barber at Plummer's Island, Md., among a number of Turkey Vultures that were circling over a dead hog.

Aquila chrysaetos (Linn.), *Golden Eagle.*—An unusually fine specimen of the Golden Eagle was received in the flesh by the U. S. National Museum recently. The bird was secured by Mr. Brooke B. Gochnauer on March 10, 1919, near Upperville, Fauquier Co., Virginia. Mr. Gochnauer sent the bird to Mr. John A. Baker of Washington who presented it to the National Museum. As the specimen had been drawn the sex could not be determined, but it was an adult bird, probably a male. Mr. George Marshall, who prepared the skin, tells me that he mounted an adult bird, secured, as near as he could remember, in the spring of 1913 or 1914, at or near The Plains, Fauquier County, Va. The specimen had considerable lamb's wool entangled in the talons. The name of the person who shot the bird, and to whom he returned it was Beverly. Another apparently unreported Golden Eagle was received by Mr. Albert E. Colburn, alive, in late December, 1899, or early January, 1900. Mr. J. H. Riley, who examined the specimen at the time, thinks that it came from the Peaks of Otter, Blue Ridge, in western Virginia. On February 5, 1896, two Golden Eagles were received by the National Zoological Park from J. W. Pattison, Wytheville, Wythe Co., Va. One bird died August 6, 1896, and the other lived until October 7, 1904. Both specimens are in the U. S. National Museum collection. There are also several other unrecorded Golden Eagles in the U. S. N. M. collection from Virginia and Maryland taken in the fifties and sixties.—*B. H. Swales.*

COLOR OF SOFT PARTS IN *ANHINGA ANHINGA.*

On February 25, 1919, I killed an adult male Anhinga in the lagoons near West Lake, above Cape Sable at the southern end of Florida, in which the coloration of the mouth and the space about the eye were so striking and remarkable as to merit a description. Certainly no artist who had not handled such birds in the flesh would have depicted these parts as they appeared in life. The culmen of the bird in question was dusky, and the rest of the bill yellowish brown, save for the base of the mandible which was black. The outer surface of the gular sac was dull black. The inside of the mouth was colored as follows; the premaxilla and the mandibular rami were dull yellowish; the margins of the choanæ were whitish, and the rest of the inside of the mouth including the lining of the gular pouch was solid black, forming a background that set off the lighter colors in deep contrast. The iris was deep wine-red. The margin of the eyelids all around was a very bright shade of blue, bordered narrowly by a band of dull green, while the remainder of the lids was black. The lores and a line above the eye were dull yellowish green, a color that extended around posteriorly to a point below the posterior canthus. A blackish line ran through the center of the loral region back to the eye. The space beneath the eye, extending back to the posterior margin of the bare area, was dull

bluish green. The feet and legs were yellowish, becoming duller on the webs between the toes and changing to horn-brown on the anterior scutes of the tarsus and the upper surface of the toes.

Published descriptions of the soft parts of the Anhinga so far as they have come to attention seem to be based upon Audubon's account from which the notes given above vary in certain particulars. Audubon states that the gular sac is orange and makes no mention of the brilliant blue line on the margin of the eyelids. Mr. A. T. Wayne[1] has called attention to the fact that the gular sac is black in the adult male Anhinga.

Examination of dried skins for the color of the soft parts is usually unsatisfactory, but in the present instance may serve to determine the color of the gular sac. In eight males, in the collections of the U. S. National Museum, in fully adult plumage, taken in March, April, May and June, three have the gular sac black while in five it is orange. In four adult females killed in March and May three have the sac orange, while one has it colored a deep black. All of these birds, judging from their plumage, were fully adult. The sac is universally colored yellowish or orange in all of the immature birds that have been examined. From a consideration of these facts it seems probable that the black color of the gular pouch and the brilliant color about the eye are characters that develop with age, and that they may not appear until a bird is two years old, or more. On the basis of this explanation the comparatively small number of Anhingas in full color in collections may be supposed to come from the smaller number of adults, as compared with young birds, and the greater wariness of the adults that enables them more often to elude the collector.—*Alexander Wetmore.*

A NEW NAME FOR HELIASTER MULTIRADIATUS (GRAY).

The *Asterias multiradiata* of Gray (Ann. and Mag. Nat. Hist., Vol. 6, 1840, p. 179) is antedated by *Asterias multiradiata* Linnæus (Syst. Nat., 10th edition, 1758, p. 663); the starfish now known as *Heliaster multiradiatus* (Gray) may be called **Heliaster solaris,** nom. nov.—*Austin H. Clark.*

NOTES ON LUCANIA OMMATA (JORDAN).

When Dr. Hay described this form as *Zygonectes mannii* he held that it might "contend with *Heterandria formosa* for the honor of being the smallest known bertebrate." It has since lost this distinction but yet remains an interesting fish because of its apparent rarity. The discovery of it in the Okefinokee Swamp and its occurrence there in abundance prompts a few notes about its habitat and characters.

We have 63 specimens of this rare form in 13 different collections from the swamp. In the summer of 1912 one of the authors secured it from Honey Island Prairie, May 29, 1912; between Honey and Billy Islands, June 1, 1912; in Billy Lake, June 4; on Billy Island, June 1; on Jones Island, June 24. On Dec. 25 and 26, 1913, Dr. J. C. Bradley secured it at

[1] Auk, 1911, p. 107.

Billy Lake Landing and in a bog on Billy Island. On Dec. 26, 1916, Mr. Francis Harper took it at Minnie Lake Narrows; on Floyd's Island Prairie, on Jan. 4, 1917, and on Chase Prairie, Jan. 12, 1917.

In 1881 R. E. Earll took two females in Indian River and in 1884 Jordan described it. In Dec., 1890–Jan., 1891 Albert J. Woolmann found 2 males and 3 females in the Santa Fe river (Suwanee River system). With two specimens (*Zygonectes mannii* Hay) taken by Mann and Davidson in Yellow Water River, western Fla., we have 9 specimens. It is widespread in the swamp and the appearance of such a large series with no conscious effort made to collect them and non-recognition of the species by us during the 1912–1913 trips shows it to be a common form in the swamp. Later in 1916–1917 Mr. Harper was on the lookout for it. He had examined some of the 1912–1913 material.

In total length these specimens range from 10 mm.–25 mm., the largest being a male; the standard lengths 8.5–21 mm. The head varies from $3^1/_4$–$3^3/_4$ in the length, the depth $4^1/_3$–5, the lateral row of scales 27–32.

This beautiful little killifish is smaller than *Lucania goodei* and averages larger than *Heterandria formosa*. With both it has some phases of coloration in common. In coloration these 63 specimens fall into two groups; those with lateral black ocellus just in front of the origin of the anal (females); and those without the spots (males). Both sexes have the caudal ocellus in our series except for one specimen which may be male or female and which is without anal or caudal ocellus or any dark bands of minute dots. Woolmann with 2 males in hand declared they have no caudal ocellus but all the males of our series have it. In several it is smaller than in the female and a part of the last brown transverse bar, but in the largest specimen of the 63, a male, the black ocellus has replaced the transverse brown bar. In all the males there is no real clear-cut ocellus just above and in front of the origin of the anal fin, yet in all there is a suggestion of it in an indistinct collection of black dots. The males have from base of caudal to front of the dorsal origin from 5–7 more or less distinct transverse brown bars in the younger individuals, 3–4 in the older individuals. In the latter group these bars are restricted to the caudal peduncle and the oldest males have a tendency to lose transverse bands entirely and become punctate all over the body. In the male the dorsal and anal may be very narrow (D. 4 or 5, A. 6 or 7) and the tip of dark punctate fins reach almost if not to the base of the caudal. In the females these fins are plain, never approach the base of the caudal and usually have 6 or 7 rays in the dorsal and 8–10 rays in the anal. Thus the anal fin may be modified though Woolmann's two specimens did not show it. If both sexes be considered the dorsal may be from 4–7 in rays and the anal from 6–10. Another puzzling condition is that several of the males are amongst the largest specimens of the series. These males have the tips of the ventral fins black. The males have not the lateral brown bands of the female but in addition to the basal transverse brown band (in both sexes) of the

caudal rays they have two or three more transverse bands (not in female), on the caudal fin and occasionally a black tip to the tail.

The female is an exquisite little fish. The most striking marks are the two ocelli one at the base of the tail and one just ahead and above the origin of the anal. A lateral brown band reaches from the anal almost to the caudal ocellus where it may fork and join the caudal transverse brown band above or below. From the tip of the snout backward along the dorsum to the base of the tail is an area of brown minute dots. This area continues as a transverse band around the base of the tail and as a line on the lower edge of the caudal peduncle until it reaches the anal fin where it forks and proceeds to the vent. Sometimes each of these forks join a lateral band which faintly runs from the anal ocellus forward halfway to the pectoral fin. Then from the pectoral fin forward across the opercle and through the eye to the tip of the snout there is a faint suggestion of the lateral band of *Lucania goodei.* Between the brown areas and bands, on the belly and around the caudal ocellus are more or less sharp straw-colored areas.

We found this species in almost all the open prairies visited, in wooded waterways between islands, in cut-off ponds on the islands and in sphagnous areas. Its associates were *Gambusia affinis, Fundulus cingulatus* and *Fundulus nottii.* The discovery of this fine little fish in the swamp is one of the best fish records of the Okefinokee list.

Recently, the authors noticed two other records for this same species; one captured at Port Saint Joe, Fla., in Jan., 1917 (Aquatic Life, Mar., 1919, IV, No. 7, pp. 89, 90); and the other at a pond of Milltown, Ga. (tributary to Allapaha River) in May, 1919 (ibid., Jan., 1920, V, No. 1, p. 2). The first of these by Mr. W. W. Welch is synchronous with Mr. Harper's records in the Okefinokee Swamp for Dec. 26, 1916, Jan. 4, and Jan. 12, 1917; and the other by Dr. H. M. Smith is curiously from the same river system as Woolman's specimens of 1890 and our material of 1912–1917. It is interesting to note that these three records come from the three main tributaries of the Suwanee, namely: Allapaha (Smith, 1919), Santa Fe (Woolman, 1890), and source of main river of the Suwanee, the Okefinokee Swamp (Wright and Palmer, Harper, 1912–1917). In other words, the whole Suwanee river system has it and as yet it seems the center of its greatest abundance. Our account written sometime before the appearance of the two recent articles agrees very closely with and only amplifies Mr. Welch's description and his sketches represent our material of this species sufficiently to obviate the contemplated figures of this article.—*A. H. Wright* and *E. L. Palmer.*

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